UNIVERSIDADE TÉCNICA DE LISBOA
INSTITUTO SUPERIOR DE ECONOMIA E GESTÃO

Mestrado em Economia e Estudos Europeus

THE EASTERN ENLARGEMENT OF THE EUROPEAN UNION AND THE COHESION COUNTRIES: COMMODITY COMPOSITION OF TRADE IN MANUFACTURES AND TRADE POTENTIAL

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Any comments and/or suggestions about the dissertation may be addressed to the following e-mail: enriquegalanyvelasco@yahoo.es

ACRONYMS

2SLS Two Stage Least Square estimator.

CC Cohesion Countries, to be precise Spain, Ireland, Portugal and Greece.

CCT Commodity Composition of Trade.

CEEC Central and Eastern European Countries, that is to say the following: Latvia, Lithuania, Estonia, the Czech Republic, Slovakia, Slovenia, Poland, Romania, Bulgaria and Hungary.

CEEC1 Relatively high PIB *per capita* Central and Eastern European Countries, that is to say the following: Slovenia, the Czech Republic, Hungary, Slovakia and Poland.

CEEC2 Relatively low PIB *per capita* Central and Eastern European Countries, that is to say the following: Estonia, Lithuania, Latvia, Romania and Bulgaria.

CN Combined Nomenclature, defined by the structure of the European Commission foreign trade database known as *Comext*.

COS Cosine Measure.

EEC European Economic Community, defined as the existent institutional structure until the European Single Act in 1986.

EIS Export-Import Similarity Index.

EMU Economic and Monetary Union, formed by the countries that share the Euro as their single currency unit, namely Portugal, Spain, France, Germany, Belgium, the Netherlands, Austria, Finland, Luxembourg, Ireland, Italy and Greece.

EU European Union formed by twenty-five countries, i.e. from 1st May 2004 henceforth.

EU11 European Union excluding CEEC, CC, Malta and Cyprus, namely the following set of countries: Germany, France, United Kingdom, Italy, Belgium, the Netherlands, Luxembourg, Sweden, Austria, Finland and Denmark.

EU12 European Union as set up by the Maastricht Treaty.

EU15 European Union excluding CEEC, Malta and Cyprus, namely the following set of countries: Germany, France, United Kingdom, Italy,

	Belgium, the Netherlands, Luxembourg, Sweden, Austria, Finland, Portugal, Spain, Ireland, Greece and Denmark.
EU25	Current European Union, excluding Malta and Cyprus, but including Romania and Bulgaria.
FDI	Foreign Direct Investment.
FEM	Fixed-Effects Model.
FGLS	Feasible Generalised Least Squares.
GDP	Gross Domestic Product.
GMM	Generalised Method of Moments.
GNP	Gross National Product.
IV	Instrumental Variables, namely Two Stage Least Square estimator.
MER	Market Exchange Rates.
NACE	Classification of Economic Activities in the European Community.
OLS	Ordinary Least Squares.
PML	Poisson Pseudo-Maximum Likelihood Estimator.
PPP	Purchasing Power Parity.
REM	Random-Effects Model.
RoW	Rest of the World, excluding EU25.
TSI	Trade Similarity Indexes.
WLS	White's heteroskedasticity-consistent co-variance matrix within OLS method.
XFE	Three-Way Fixed-Effects Model.

ABSTRACT

In order to evaluate the trade potential of the Cohesion Countries (CC) with the remaining EU11 countries in the threshold of the eastern enlargement of the European Union, as well as with the CC relations with the Central and Eastern European Countries (CEEC), we use a gravity model. The manufacturing trade potential related to the twenty-five countries involved in the eastern enlargement of the EU15 is hence calculated from 1999 to 2002. Special attention is paid to this enlargement's effect on the CC within this approach.

Relatively to previous studies with this same methodological approach, this dissertation is, to the best of our knowledge, the first combining a trade potential based on the gravity model with the inclusion of a variable related to the Commodity Composition of Trade (CCT) in terms of manufactures. Several CCT variables were tested for the available data, taking into consideration high levels of disaggregation.

Finally, having in consideration the latest academic debate in course, we analysed and tested all the methodological contributions recently proposed in the literature as regards to the improvement of the econometric specification of the gravity model, namely making use of the Poisson Pseudo-Maximum Likelihood Estimator. The refinement of the explanatory variables considered in the analysis, specifically those related to the distance measurement, as well as the introduction of new variables, were also taken into consideration.

Keywords: Economics of Integration and Transition, Central and Eastern European Countries, Trade Potential, Gravity Model, Panel Data, Commodities Composition of Trade in Manufactures.

JEL (Journal of Economic Literature) Classification System: C23, F14, F15, F17, O57 and P52.

RESUMO

Com o intuito de avaliar o potencial de comércio existente entre os Países da Coesão e os restantes países membros da UE15 no limiar do alargamento desta última a leste e, de igual forma, entre os PC e os denominados como Países da Europa Central e Oriental (PECO), fazemos uso de um modelo gravitacional. Assim, o potencial de comércio em termos de manufacturas relacionado com os vinte e cinco países envolvidos no processo do alargamento a Leste da UE15 foi calculado, nesta dissertação, no que diz respeito ao período que medeia entre 1999 e 2002. Neste contexto, especial atenção foi colocada nos efeitos específicos deste alargamento nos Países da Coesão.

Relativamente aos estudos prévios que fazem uso desta mesma abordagem metodológica, esta dissertação é, segundo a nossa percepção, a primeira a combinar o cálculo do potencial de comércio, tendo por base um modelo gravitacional, com a inclusão, neste último, de uma variável relativa à Composição do Comércio em Manufacturas (CCM). Vários indicadores da CCM foram, a este respeito, testados a partir dos dados disponíveis e fazendo uso de níveis detalhados de decomposição.

Finalmente, aprofundar-se-á o debate em curso, quer em termos empíricos, quer em termos académicos, através da análise e teste das mais recentes contribuições propostas no que diz respeito à melhoria da especificação econométrica do modelo gravitacional, nomeadamente com recurso ao Pseudo-estimador de Máxima Verosimilhança do Tipo Poisson. O refinamento das variáveis explicativas consideradas na análise, especificamente aquelas relacionadas com a mensuração da variável distância, e a introdução de novas variáveis foram igualmente abordadas.

Palavras-chave: Economia da Integração e da Transição, Países da Europa Central e Oriental, Potencial de Comércio, Modelo Gravitacional, Dados em Painel, Composição do Comércio em Manufacturas.

Sistema de Classificação JEL: C23, F14, F15, F17, O57 e P52.

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INTRODUCTION

Eight countries from the Central and Eastern Europe were formally integrated in the European Union (EU) on the 1st of May of 2004. This experience will be predictably repeated at least for two other countries (Romania and Bulgaria) in 2007[1]. Consequently, a region of approximately one hundred and four million people (27.2% of previous EU15's figure), currently occupying a land area that is equivalent to 33.5% of that of the previous Union, representing a GDP which is 11% of that of the EU15 and formerly under the soviet dominance, has recently become part of the European Union[2].

In addition, these ten countries, here henceforth called Central and Eastern European Countries (CEEC) following EGGER (2002) nomenclature, present different patterns of specialisation and competitive advantages as regards to the majority of the EU15. In addition, they are clearly moving towards macroeconomic stability and are also experiencing high growth rates. Moreover, they have a highly qualified workforce, which makes them particularly attractive for FDI, either from inside the EU or from other international sources.

This process of reintegration into the European economic and political system has two interrelated aspects, namely, internal domestic transformation and external relationship with the EU25 economic system. These two viewpoints have largely determined the economic growth and the international economic relations of both the EU15 countries and the CEEC. Particularly, the impact of the trade liberalisation between these two blocs is a standpoint that has caused apprehension and equally motivated several academic studies.

Indeed, we must take into consideration the fact that this trade liberalisation, driven by the Europe Agreements, included an asymmetric reduction of trade barriers. In fact, the CEEC´s profited from a period of (a

[1] Malta and Cyprus are set aside due to the specifities owned by the so-called Small Insular Developing States. See, for instance, WITTER *et al.* (2002) for an enumeration of their specificities, which avoid their inclusion into this dissertation.
[2] Source: European Commission's New Cronos Database in November 2003.

maximum of) ten years as they became committed to liberalise market access for industrial goods, whereas the EU15 only benefited from a five-year transition period. The major outcome of these two concessions was a Free Trade Area that started on January 2002, galvanized, two years and four months later, into an Economic Union.

Furthermore, the CEEC provide an interesting case for generalising transition and regional integration, a phenomenon that, on its turn, contributes to the development of the so-called *economics of transition and integration* (following PAAS (2003, pp. 20) terminology), particularly if we take into consideration the existence of countries with different economic and political backgrounds.

As a main standpoint, it must be noted that the bilateral trade possibilities and the structure of foreign trade have, indeed, assumed a central position due to the last years' new economic context, namely the new economic development paradigm, the globalisation phenomenon and the increasing competition bore by the national companies, either on the domestic or the external market.

In the case of the European economies that assumed themselves as pioneers in the European Monetary Union (EMU), the loss of the monetary and exchange policies has turned the Governments' attentions towards the achievement of their sustainable foreign development, based on increasing both their international and internal competitiveness in terms of offered goods and services.

Within this context, this dissertation attempts to evaluate, at the bilateral level, the trade potential between three considered blocs of countries, namely the Central and Eastern European Countries (CEEC), the Cohesion Countries (CC) and the remaining countries belonging to the European Union (EU11).

In fact, the enlargement of the European Union to the Central and Eastern European Countries simultaneously imposes itself as a coherent set of challenges and opportunities for all parties involved and especially for the Cohesion Countries as a whole.

It must yet be mentioned that most studies devoting their efforts to the analysis of the consequences of the EU's last enlargement almost exclusively dedicate themselves to the process of *trade adjustment*[3] within the EU15 Internal Market as a whole. This approach will be named, from now on, the *Domestic Competitive Challenge Approach*.

These existing studies conclude that the exports of the new adherent countries have the potential to substitute the exports of the members of the EU15 in its common market, creating costly social and economic macroeconomic adjustments in the latter[4]. At this respect, the Cohesion Countries appear as the most damaged countries due to the coincidence of their foreign trade structure and that of the CEEC.

However, this enlargement also opens several new possibilities in terms of trade capabilities regarding the exporting flows from the members of the EU15 to the tempting markets of the CEEC. Notwithstanding, the analysis of the consequences of the eastern enlargement has not been conveniently carried out, especially as regards to the Cohesion Countries.

Within this context, the purpose of this dissertation is the analysis of this forgotten approach, which scrutinizes the trade opportunity that the blossoming CEEC domestic markets represent for the CC. This overture will be henceforth referred to as the *Latent Opportunity Approach*.

Thus, this dissertation will focus on the trade dimension of the reintegration of the Central and Eastern European Countries into the European economy, with a special emphasis on the Cohesion Countries. The subsequent bilateral foreign trade adjustments that are expected to occur will be inferred throughout this dissertation, from the available data, in the threshold of this enlargement, namely in the 1999-2002 period.

[3] Note that the designation trade adjustment is defined just as the sum of effects, in terms of international trade, brought about by some exogeneous shock, such as the eastern enlargement of the EU15 in our case.
[4] Namely the following: COLLINS & RODRIK (1991), HAVRYLYSHYN & PRITCHETT (1991), WANG & WINTERS (1991), HAMILTON & WINTERS (1992), ROSATI (1992), BALDWIN (1993, 1994, 1997), WINTERS & WANG (1994)[4], GROS & GONCIARZ (1996), IVERSEN (1998), CORNETT & IVERSEN (1998), FIDRMUC (1999), BUCH & PIAZOLO (2000), NILSSON (2000), PAAS (2000, 2002, 2003), AFRICANO & TELES (2001), LAASER & SCHRADER (2002) and AFRICANO (2004).

Methodologically, we endeavour to estimate a gravity model that permits not only the identification of the determinant factors of foreign trade, something usual in this kind of literature, but also to take into consideration the bilateral trade potential in terms of manufactures involving each one of the EU25 members. Within this context, this dissertation is, to the best of our knowledge, the first that aims at calculating a bilateral trade potential focused on the totality of EU25 countries while paying special attention to the bilateral flows involving both the CEEC and the CC.

Moreover, this dissertation is, also to the best of our knowledge, the first combining the trade potential estimation, based on a gravity model, with the inclusion of a variable related to the Commodity Composition of Trade (CCT) in terms of manufactures. We will observe throughout this section that few studies take into account detailed information about the commodity structure of manufactures trading flows, i.e., the measure of the similarity between the symmetric trade vectors of pairs of countries, originally developed by LINNEMANN (1966). Furthermore, none of the above mentioned studies pay any attention to the CEEC nor the CC when considering the recent enlargement. Several CCT variables will therefore be tested, for the available data, paying special attention to their relatively substitutive items in terms of higher levels of decomposition (6-digit).

Having in consideration the academic debate in course, we intend to analyse and test all the recent empirical contributions regarding the improvement of the econometric specification of the gravity model. Namely, we take into consideration the superiority of the Poisson Pseudo-Maximum Likelihood Estimator (PML) over the several alternative specifications tested throughout this dissertation. Furthermore, the refinement of the explanatory variables considered in the analysis, namely those related to the distance measurement, and the introduction of new variables will also be tested.

Finally, as regards to the structure of this dissertation, it would have been unavoidable to start by thoroughly analysing both the recent trends and the

foreign trade structures of the CC and the CEEC, both sectorally and globally. This will constitute the *first chapter of the first part* of this dissertation.

After this first approach, we formulate, in the *second chapter,* a literature review relative to the origins and subsequent evolution of the several measures considered in this dissertation regarding the Commodity Composition of Trade (CCT). Additionally, and within this framework, we make a comparative analysis of the two main measures discussed, namely the Cosine Measure (COS) and the Export-Import Similarity Index (EIS).

Regarding the *second part*, a literature review framing will inaugurate the discussion about the gravity model to be used in its *first chapter*. Special attention is given not only to the several econometric specifications, but also to the refinement and addition of the explanatory variables proposed.

Subsequently, the *second chapter of this second part* is intended to determinate the factors influencing trade either in terms of cross-section data or panel data. The estimation of the potential level of the bilateral foreign trade between each one of the EU15 members and the CEEC, now that the liberalisation process and its structural adjustment period are finally concluded, will be tackled afterwards.

The *final stage* summarizes the main conclusions obtained throughout this dissertation.

PART I

CHAPTER I - COMPREHENSIVE DESCRIPTION OF THE FOREIGN TRADE STRUCTURES INVOLVING THE CENTRAL AND EASTERN EUROPEAN COUNTRIES AND THE UE15

After having reoriented its trade towards the European Union partners during the early nineties, the Central and Eastern European Countries (CEEC) have been aiming at converting their export possibilities into real exports[5]. However, as it follows, the actual trade flows involving both the CEEC and the European Union members seem to be above those analogous trading flows involving the former and the Cohesion Countries (CC).

Indeed, it must be firstly taken into account that the EU15 was the first trade partner of the CEEC (it represented 63.87% of CEEC's total trade in 2002[6], whereas Russia appeared as their second biggest trade partner, only representing 5.53% of CEEC's total trade in the same year). However, this static outlook must be properly complemented by an analysis regarding comparative statics, which would show how the share of the EU15 in the CEEC's total foreign trade had slightly decreased during the considered period. In fact, it already represented 66.82% in 1999.

Despite this unexpected outcome, as regards to the period ranging from 1999 to 2002, one cannot avoid mentioning that the subsequent absolute figures in terms of total foreign trading turnover increased by 50.01% in the 1999-2002 period (having additionally seen their figures multiplied by three if we consider a wider scope of time, namely from 1993 to 2002)[7].

It can be observed in addition that, despite the significant enhancement experienced by the CEEC's trade relations with the EU15 during the last years, the analogous performance revealed by these CEEC as regards to the RoW has

[5] See for this purpose BEERS & BIESSEN (1996)'s conclusions. However, only the trading structures of Poland and Hungary were taken into account by these authors, avoiding global considerations about the remaining CEEC.
[6] A number that rises to 71.99% if we consider an enlarged EU25.
[7] The data source throughout this chapter is found at European Commission's Comext Database.

slightly overcome the former in terms of trading turnover (CEEC's total foreign trading turnover increased by 56.92% in the 1999-2002 period), as a result both of the CEEC's great economic growth and their increasing openness degree.

By comparing the above figures, defined as the total foreign trade turnover with the RoW, with the analogous figures presented, it can be observed that, whereas the CC total trade with the RoW reached € 522.15 billions in 2002, the CEEC analogous value only represented € 346.76 billions (66.41% of the previous value). Consequently, it can be concluded that the CC are nowadays a bigger global trading bloc than the CEEC.

The above context is deepened, namely by analysing the bilateral trading flows involving both the CEEC and the EU15 members, in the *first section of this chapter*. After this first characterisation, more specific bilateral flows will be analised by taking into consideration the previous set of CEEC trading partners in the *second section of this chapter*, namely those involving the CC, aiming at the final object of this dissertation.

Additionally, a deeper view into the specific case that Ireland represents and, subsequently, into its exceptional causes, could not be avoided, which will be undertaken on this chapter's *third section*. A complementary analysis will be carried out in the *fourth section* as regards to the interesting conclusion obtained from the classification of the available data according to the sectoral division inaugurated by PENEDER (2001). This author defines two types of sectoral division according both to a factor-input and to a labour-skill criterion. An additional criterion, related to the demand dynamism presented by each sector during the considered period, will be also used.

Finally, a measure of the trading flows' concentration in a reduced number of class products will be developed in the *fifth section* for all the EU25 countries, a result that will be lately analysed as a source of bias as regards to some results.

I.1.1 Bilateral Trading Flows involving the CEEC and the EU15

As explained before, we will first turn our attention to the characterisation of the CEEC-EU15 bilateral trading flows, either CEEC's exporting flows to the EU15 or the corresponding CEEC's importing flows from the EU15.

On what concerns the *CEEC's exports to the EU15*, this flow increased by 56.61% from 1999 to 2002, while accounting for 66.01% of CEEC's total sales in 2002 (corresponding approximately to € 119 billions). Its main industrial exports to the EU15 were in 2002 the "High-Skill", "White-Collar", "Technology-Driven" industries, following PENEDER (2001) terminology. Particularly, the role played by the Trilogy "Electrical Machinery and Equipment", "Machinery and Mechanical Appliances" and "Vehicles other than Railway or Tramway" (Codes 85, 84 and 87 accordingly to 2-digit Comext's Combined Nomenclature) must be highlighted, representing 15.65%, 15.02% and 12.91% of total exports in 2002, respectively (13.55%, 13.75% and 12.51% in 1999). It must also be borne in mind, as a comparative figure, that the CEEC's main agricultural exports to the EU15 were "Meat and Edible Meat" (Code 2), attaining only 0.52% of total sales in 2002.

However, the weight represented by the "Labour Intensive" and "Low Skill" industries, following PENEDER (2001)'s taxonomy, must be also highlighted. For instance, sectors such as "Textile and Footwear" (covering codes ranging from 61 to 64) and "Wood and Furniture Related Sectors" (codes 44 and 94) represented 10.84% and 9.26% of total trade in 2002, respectively[8].

Furthermore, by taking into consideration the *CEEC's importing flows from the EU15*, it is observed that the EU11 countries played a dominating role, accounting, on average, for 61.06% of CEEC's total imports in 2002 (approximately € 133 billions). The EU15 appears, therefore, as the most important partner for these ten countries, namely Germany, which was, by far, the main supplier in 2002, representing 29.19% of total CEEC's imports,

[8] See Table III-2,, first group of columns, in the annexes.

followed by Italy, France and Austria (9.13%, 6.16% and 5.63%, respectively)[9]. In fact, apart from these EU11 countries, only the remarkable third place obtained by Russia deserves some attention (9.03% of CEEC's total imports).

In fact, with the exception of Russia, it can be observed that the main suppliers of the CEEC are relatively big developed and geographically close economies. A deeper scrutiny of the relevance of this constatation will be tackled later on, making use of an econometrically robust gravity model.

In this respect, the increase experienced in terms of absolute trading turnover must also be highlighted. It was 44.55% higher in 2002 when compared to 1999. Consequently, the ten CEEC raised its relative position in the analysed period, having become the EU15's second trade partner after the United States, accounting for 12.69% of the EU15's total external trade (12.03% of total imports and 13.35% of total exports, respectively)[10].

Moreover, the bulk of industrial imports from the EU15 countries were constituted by the trilogy "Machinery and Mechanical Appliances", "Vehicles other than Railway or Tramway" and "Electrical Machinery and Equipment" (representing 17.89%, 13.9% and 13.79% of total imports in 2002, respectively), as it analogously happened in the case of the CEEC's exports to the EU15. It must be borne in mind, as a comparative measure, the fact that the CEEC's main agricultural importing flow from the EU15 corresponded to "Cotton" (Code 52), mostly from Italy, Greece and Portugal to Romania and Bulgaria, representing 1.15% of total imports[11]. Indeed, regarding the latter flow, its relatively high weight is due to the importance represented by the textile industry in the total Romanian or Bulgarian economies (weighting 25.8% and 24% of total exports in 2002, respectively).

Additionally, the *EU15's trade surplus with the CEEC* amounted to € 13.84 billions in 2002, having decreased from the € 15.92 billions previously achieved in 2000. This trend caused the CEEC's coverage ratio to reach almost

[9] For detailed data, see Table III-4 in the annexes.
[10] For detailed information, see Table III-5 in the annexes.
[11] See Table III-2, second group of columns, in the annexes.

89.6% of total imports in 2002, somehow illustrating how the CEEC have succeeded in gaining some trading space as regards to the EU15 market.

On what concerns the *EU15's main trading partner among CEEC countries*, similarly to what had already occurred in 1999, Poland occupied the main position in 2002 (accounting for 27.74% of CEEC imports from the EU15 and 23.66% of CEEC exports to the EU15), while Latvia remained the smallest partner (1.91 % and 1.63%, respectively)[12].

Summing up, CEEC's trade relies heavily on their relationship with the EU15. Nevertheless, these figures widely vary when taking into account the CEEC individually. Whereas some of these countries have turned their trade structure around in favour of the EU15 members during the past ten to fifteen years, as it is the case of Slovenia (where EU15 weight on total trade achieved 68.27% of total trade in 2002) or the Czech Republic (66.87%), others such as Bulgaria (53.66%) or Lithuania (48.24%) have roughly maintained the same structure of partners for their foreign trade relationships. Within this context, Russia still represents a relatively high weight on the foreign trade relationships of the last two countries (16.07% in the case of Lithuania and 8.99% in the case of Bulgaria)[13].

I.1.2 Specific Bilateral Trading Flows involving both the CEEC and the CC

On what concerns a more **s**pecific characterisation of the bilateral trading flows involving both the Central and Eastern European and the Cohesion Countries, the marginal role played by the latter as regards to the CEEC's foreign trade preferences must be highlighted. Indeed, it seems clear that the current ties existing between the CEEC and the CC lag behind those analogous linkages

[12] For detailed data, see Table III-3 in the annexes.
[13] For detailed data, see Table III-4 and subsequent developments in tables ranging from Table III-4 A to Table III-4 L in the annexes.

existing between the above mentioned groups of countries and the more developed economies of the EU[14].

Within this context, we will pay attention, in the first part of this section, to both CEEC importing and exporting flows own characteristics. The analogous CC trading flows will be tackled in the second part.

Thus, taking a deeper view of the former, it is clear that *CEEC's importing flows* are dominated by EU11-countries, accounting, on average, for more than 65% of their total imports, as showed in the above section. However, some modifications have been revealed in the above pattern during the last years. In fact, the share of CEEC imports coming from the CC has steadily increased during the period, from 3.13% of CEEC total imports in 1999 to 3.44% in 2002.

Their main industrial imports from the CC were also composed by the trilogy "Vehicles other than Railway or Tramway", "Machinery and Mechanical Appliances" and "Electrical Machinery and Equipment", representing 21.03%, 14.82% and 12.66% of total CEEC imports from the CC in 2002, respectively, whereas CEEC's main agricultural import was "Edible Fruit, Nuts, Citrus, Fruits and Melons" (Code 08), almost totally from Spain and Greece, attaining 5.51% of total imports[15].

Taking into consideration each country individually, whereas Spain occupies the EU15's eleventh position with a meagre 2.17% of CEEC total imports, Greece, Ireland or Portugal stay far below (0.62%, 0.44% and 0.21%, respectively in 2002)[16]. However, taking into consideration specially relevant linkages, the significance of Greece as the Bulgaria's fourth main supplier must be highlighted, representing 6.97% of total imports in 2002 (only below Russia (14.33%), Germany (13.76%) and Italy (10.12%)), specially composed by "Textile Articles" (Codes 60 to 62)[17] and mostly due to the existence of a common border between them, a fact that will be tackled later on. Moreover, one

[14] For detailed data, see Table III-6 in the annexes.
[15] For detailed data, see Table III-4 A in the annexes.
[16] *Idem*.
[17] Representing 33.64% of Bulgarian total imports from Greece in 2002.

must also underline the noticeable role performed by Spain as one of the most important suppliers of either Slovenia (3.06% of total Slovenian imports, achieving the seventh position) or Slovakia (2.81% of total Slovakian imports, reaching the ninth place), both of them mainly composed by "Vehicles Other than Railway or Tramway" (Code 87) (32.5% and 73.23% of either Slovenian or Slovakian imports from Spain, respectively)[18].

On the other hand, the picture remains mostly the same when observing *CEEC's exporting flows*. Once again, the CC still represent a marginal role within this trend, much behind those analogous linkages existing between either the CC or the CEEC and the more developed economies of the EU.

Taking a deeper view, it is clear that CEEC exports flows are even more dominated by EU11-countries than the observed in the case of the importing flows, accounting, on average, for more than 72% of their total exports. In fact, Germany, with 34.21%, was, by far, the main client of the CEEC in 2002, followed by Italy, Austria and United Kingdom (8.58%, 7.04% and 5.48% of CEEC's total exports, respectively).

In spite of this, some modifications occurred during the last years are noticeable as regards to the UE11 intense predominance as CEEC's customers, slightly stronger than those previously observed in the case of the importing flows. In fact, the share of CEEC exports to the CC has been strongly increasing during the period, from 2.93% of CEEC total exports in 1999 to 3.65% in 2002, representing a remarkable relative improvement. Their main industrial exports to the CC were also the trilogy "Machinery and Mechanical Appliances", "Electrical Machinery and Equipment" and "Vehicles other than Railway or Tramway", representing 21.57%, 16.02% and 14.48% of total CEEC exports to the CC in 2002, respectively. It would be also interesting, as a comparative measure, to point out that the CEEC's main agricultural exporting flow appeared to be "Cereals" (Code 10), mostly from Bulgaria and Hungary, attaining just 1.47% of exports in the same year.

[18] For detailed data, see Table III-4 in the annexes.

Taking each country individually, it must be highlighted that whereas Spain occupies the EU15's ninth position with a meagre 2.04% of CEEC total exports, Greece, Portugal or Ireland are much further back (0.78%, 0.52% and 0.31%, respectively in 2002)[19].

Moreover, within this approach and taking into consideration relevant linkages, both the significance of Greece as Bulgaria's fifth main client, representing 5.43% of total exports in 2002 must be particularly highlighted[20], mainly composed by raw materials such as "Iron and Steel", "Mineral Fuels and Oils" and "Wood and Articles of Wood"[21].

After this Central and Eastern European Countries characterisation and entering now into the Cohesion Countries specific features, it is clear that *CC's importing flows* are equally dominated by EU11-countries, accounting, on average, for more than 66% of their total imports. In fact, apart from the remarkable fifth place obtained by the United States (6.09% of CC's total imports), six of the first seven suppliers of the CC belong to the EU11. Germany, with 15.32%, was by far the main provider for the CC in 2002, followed by France, United Kingdom and Italy (13.71%, 13.62% and 8.22%, respectively)[22].

However, some modifications have taken place during the last years, as illustrated by the analysis as regards to comparative statics covering the period ranging from 1999 to 2002. In fact, although still marginal, the share of CC imports coming from the CEEC steadily increased during the period, from 1.54% of CC total imports in 1999 to 2.17% in 2002 (which interestingly represent much lower relative values than those observed regarding the analogous comparative-static analysis of the CEEC importing flows from the CC, previously carried out[23]). Furthermore, the main industrial CC imports were also composed by the trilogy "Machinery and Mechanical Appliances", "Electrical

[19] For detailed data, see Table III-4.
[20] Only below Italy (16.05%), Germany (11.53%), Turkey (8.77%) and United Kingdom (6.13%).
[21] Codes 72, 27 and 44, which jointly represented 41.81% of total Bulgarian exports to Greece in 2002.
[22] For detailed data, see Table III-6 A.
[23] Allow us to remind that the CEEC imports coming from the CC represented 3.13% and 3.44% in 1999 and 2002, respectively.

Machinery and Equipment" and "Vehicles other than Railway or Tramway", representing 21.57%, 16.02% and 14.48% of total CC imports from the CEEC, respectively, whereas CC's main agricultural import was "Cereals" (Code 10), attaining 1.47% of total imports.

Taking into consideration each country individually, Poland occupies the thirty-first position with a meagre 0.48% of CC total imports, whereas the Czech Republic, Hungary or Romania present worse results (0.42%, 0.35% and 0.24%, respectively in 2002)[24]. However, taking into account relevant linkages, the relative significance of Poland as the Portuguese fourteenth main supplier must be particularly highlighted, representing 0.88% of Portuguese total imports in 2002 (above Austria (0.72%), Denmark (0.65%) or Finland (0.59%) for instance), overwhelmingly composed by "Machinery and Mechanical Appliances" (Codes 84)[25]. Furthermore, the noticeable role performed either by Romania and Bulgaria as remarkable Greek suppliers must also be underlined (1.03% and 1.00% of total Greek imports, respectively). Indeed, the Greek consumers seem to be fond of Romanian "Textile Products" (Codes 61 and 62) (47.63% of total Greek imports from Romania) and Bulgarian "Mineral Fuels and Oils" (Code 27) (25.55% of total Greek imports from Bulgaria). Once again, the privileged situation of both countries relatively to the Greek border seems to be a good explanation for this data (particularly when one takes into consideration the relative isolation that these three countries suffer relatively to the European Union geography).

On the other hand, the picture remains mostly the same when observing *CC's exporting flows*. Once again, the CEEC still represent a marginal role within this trend, quite behind those analogous linkages existing between the CC and the more developed economies of the EU11.

Taking a deeper view, it is clear that the CEEC exports flows are slightly more dominated by EU11-countries than observed in the case of the importing

[24] *Idem*.
[25] Representing 80.59% of Portuguese total imports from Poland in 2002.

flows, accounting, on average, for more than 66% of their total exports. In fact, the United Kingdom with 16.25% was the main client for the CC in 2002, followed by France, Germany and Belgium (14.24%, 11.78% and 7.69% of CC's total exports, respectively).

Despite this EU11 domination, some modifications have occurred during the last years, stronger than those observed in the case of the CC's importing flows. In fact, the share of CC exports going to the CEEC intensely increased during the period, from 2.46% of CC total exports in 1999 to 3.31% in 2002 (which represent lower relative values than those observed regarding the CEEC's exporting flows to the CC[26]). As already referred in relation to the CEEC's importing flows from the CC, the bulk of the main industrial exports to the CEEC were constituted by the trilogy "Vehicles other than Railway or Tramway", "Machinery and Mechanical Appliances" and "Electrical Machinery and Equipment", whereas the CC's main agricultural export was "Edible Fruit, Nuts, Citrus, Fruits and Melons" (Code 08).

Taking each country side by side, it must also be highlighted that whereas Poland occupies the CC's sixteenth position with a meagre 0.76% of CC total exports, the Czech Republic, Hungary or Bulgaria are far below (0.46%, 0.39% and 0.32%, respectively in 2002)[27].

Moreover, taking into account relevant linkages, the significance of either Poland, Romania and, mostly, Bulgaria as the Greece's fourteenth, ninth and fourth main client must be particularly highlighted, representing 1.11%, 2.72% and 5.35% of total exports in 2002, respectively. These exporting flows are mostly composed by "Edible Fruit, Nuts, Citrus, Fruits and Melons" (Code 08) in the Polish case, "Electrical Machinery and Equipment" (Code 85) in the Romanian case and "Textile Products" (Codes 61 and 62) in the Bulgarian case. Hence, the data leads once again to pay special attention to the neighbouring relation between countries.

[26] Note that the CEEC exports to the CC represented 2.93% and 3.65% in 1999 and 2002, respectively.
[27] For detailed data, see Table III-6 A in the annexes.

I.1.3 The Irish Specificity

At this point, it would be sensible to trace a line of division between the four CCs. Indeed, in spite of all of them being below the ninety percent of *per capita* GDP cap defined as the main criterion for the attribution of Cohesion funding when the Agenda 2000 was discussed[28], they are obviously not a homogeneous group of countries.

At first sight, Spain would seem to be an outsider due to its great demographic and economic size. Indeed, whereas Spain presented a population of 40 562.2 thousands of people in 2002, Greece, Portugal and, mostly, Ireland, were far below this level (10 950, 10 351 and 3 909 thousands, respectively). Furthermore, as regards to the GDP, whereas Spain presented a GDP at market prices of 696 208 Millions of Euro in 2002, Greece, Portugal and Ireland were far below this level (141 354, 129 280 and 129 344, respectively)[29].

However, the outsider within this sample turns out to be Ireland. Indeed, Ireland's remarkable economic performance over the course of the 1990s, which caused Irish *per capita* GDP measured according to PPP to rise from 25 percentual points below to 20 percentual points above the EU average, should be pointed out as the main differentiating factor.

Table I-1 – Dynamics of PC's *per capita* GDP measured according to PPP as EU15 average

	1991	1995	1999	2002
Ireland	**76,63%**	**93,10%**	**111,76%**	**125,27%**
Spain	80,51%	78,05%	81,91%	84,29%
Portugal	64,83%	69,63%	71,98%	68,45%
Greece	60,51%	64,71%	65,79%	65,84%

Source: Authors' calculations based on the European Commission's *New Cronos* Database, downloaded in November 2003.

However, other factors are behind this result. These include being one of the most open economies in the EU25[30], the relatively high qualification level of

[28] Although in the Irish case, the elegibility for these funds was just prolonged for the period 2000-2006 in the quality of *phasing-out*.
[29] Source: European Commission's New Cronos Database in November 2003.
[30] See Table III-7 in the annexes.

its labour force[31] or the huge degree of absorption of FDI in the economy[32], all of them justifying a virtual exclusion of Ireland from this group of four countries[33].

Thus, the exclusion of Ireland from our definition of CC would have been correctly safeguarded. However, for this dissertation's analytical purposes, this exclusion is assumed to be meaningless, due to the high competition that the Irish economy seems to be suffering from countries such as the Czech Republic or Hungary in terms of foreign trade specialisation. Equally important is the peripheral situation of Ireland in geographic terms as regards to the EU25 economic centre. Indeed, these two factors cannot be set aside and turn out to be essential similarity factors with Spain, Portugal and Greece, and are taken herewith as fundamental pillars for considering the four countries as a distinctive group.

Note that several other indicators of differentiation of the Irish situation will be found throughout this dissertation as a consequence of the previous factors, which undoubtedly make of this economy a special case, but not sufficient to invalidate our above mentioned justifications[34].

Examples of this indicators will be found in the following section, in which Ireland will exhibit extremely concentrated values in *technology-driven industries*, *high-skill workers* and *dynamic-growth sectors*. Indeed, Ireland displays the highest relative values in these three kind of industries as regards the whole EU25 universe. It shows, once again, the huge concentration of the Irish productive and exporting structure in a reduced number of sectors characterised by *high-skill labour* and *technology-driven emphasis*.

I.1.4 Sectoral Division of Trading Flows

In order to apply some sectoral taxonomies, which allow us to identify specific effects as regards to exporting flows according to different sectors, the

[31] See Table III-15 in the annexes.
[32] SeeTable III-12 in the annexes.
[33] For a more detailed discussion about the Irish evolution within the EU15 Periphery, see BARRY (2002).

4 700 manufacturing sectors considered in this dissertation, according to *Comext* Database, will be converted to the 3-digit level following the Classification of Economic Activities in the European Community (NACE) and classified according to their intrinsic characteristics.

Thus, first of all, we will consider all sectors of the *Comext*'s CN at the 6-digit level that, according to the conversion CN-NACE, are classified as manufacturing industry sectors. Consequently, we will analyse the image supplied by the average of their relative weights for the period ranging from 1999 to 2002. A complementary comparative analysis between the 1999 and the 2002 respective figures will be tackled afterwards.

In both cases, we will split total exporting figures aiming at comparing different groups of homogeneous products. We will hereby follow a series of sectoral divisions accordingly to the previous work carried out by PENEDER (2001), who defines two types of sectoral division according to a factor-input or a labour-skill criteria. Whereas the former categorises each sector as *mainstream*, *labour-intensive industries*, *capital-intensive industries*, *marketing-driven industries* or *technology-driven industries*, the latter categories do it in terms of *low-skill industries*, *medium-skill/blue-collar workers*, *medium-skill/white-collar workers* and *high skill workers*.

In addition, we will also consider another criterion of selection, according to each sectors' demand dynamism alongside the EU25 within the period 1999-2002. Within this approach, the sectors are grouped into *negative growth sectors*, *slow or nil growth sectors*, *medium growth sectors* or *dynamic growth sectors*.

Therefore, the three dissection patterns taken into consideration in this dissertation allow us to achieve several remarkable conclusions as regards to the image supplied by their relative weights in 2001. The main conclusions related can be inferred from Table I-2.

[34] See for instance the enormous concentration of the Irish exports in a low number of products (Table I-4), factor that will be broadly developed in the following section.

Table I-2 – Relative weight in exporting values to EU15 in 2001, following PENEDER (2001)'s factor-input and labour-skill criteria and also demand-dynamism criterion (6-digit CN)

	Factor-Input Criteria					Labour-Skill Criteria				Demand-Dynamism Crit.			
Exp. Country	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
CC	13.0%	*9.1%*	17.6%	14.8%	**45.5%**	25.9%	24.8%	27.6%	21.8%	20.5%	29.6%	17.9%	**32.0%**
Greece	12.6%	24.8%	28.2%	24.4%	10.0%	**73.6%**	*2.4%*	14.1%	10.0%	**52.1%**	23.6%	*7.3%*	16.9%
Ireland	*5.3%*	*2.5%*	12.7%	12.1%	**67.5%**	12.4%	*3.0%*	**37.7%**	**46.9%**	10.5%	*4.6%*	23.8%	**61.0%**
Portugal	17.8%	25.1%	15.0%	15.0%	27.1%	**41.5%**	29.2%	23.5%	*5.9%*	**34.0%**	**35.5%**	16.6%	13.9%
Spain	17.0%	*8.4%*	21.0%	16.2%	**37.3%**	28.4%	**39.4%**	22.5%	*9.8%*	22.1%	**45.1%**	14.8%	18.0%
CEEC	21.6%	25.3%	18.3%	*8.5%*	26.3%	**30.0%**	**32.1%**	27.2%	10.7%	22.6%	**37.9%**	17.7%	21.9%
CEEC1	23.5%	21.0%	17.6%	*7.6%*	**30.2%**	24.4%	**35.3%**	28.2%	12.0%	18.9%	**38.9%**	19.9%	22.4%
Czech Rep.	**30.0%**	18.9%	18.1%	*7.2%*	25.8%	22.4%	**34.6%**	25.8%	17.1%	17.6%	**37.0%**	20.6%	24.9%
Hungary	17.3%	12.9%	13.0%	*6.8%*	**49.9%**	18.1%	**30.4%**	**37.9%**	13.6%	13.6%	**34.1%**	22.2%	**30.1%**
Poland	21.5%	**30.3%**	18.9%	*9.4%*	20.0%	**30.5%**	**40.4%**	22.5%	*6.6%*	23.2%	**45.8%**	17.4%	13.6%
Slovakia	23.3%	20.4%	23.6%	*7.0%*	25.6%	28.3%	**35.4%**	26.2%	10.1%	23.7%	**38.8%**	15.8%	21.6%
Slovenia	29.6%	24.3%	20.3%	*6.4%*	19.3%	27.3%	**36.8%**	26.0%	*9.9%*	20.6%	**37.7%**	22.7%	19.0%
CEEC2	13.0%	**44.7%**	21.3%	12.3%	*8.7%*	**55.2%**	17.6%	22.4%	*4.7%*	**39.2%**	**33.2%**	*7.7%*	19.9%
Bulgaria	12.4%	**36.4%**	**34.2%**	12.7%	*4.3%*	**70.5%**	*6.6%*	15.6%	*7.2%*	**46.1%**	**30.8%**	*7.7%*	15.5%
Estonia	10.6%	**36.0%**	16.3%	*6.4%*	**30.7%**	25.6%	26.0%	**44.5%**	*3.8%*	17.7%	**33.2%**	*8.2%*	**41.0%**
Latvia	*7.1%*	**60.5%**	25.4%	*5.2%*	*1.8%*	**32.9%**	**47.1%**	17.5%	*2.5%*	23.5%	**56.1%**	*2.9%*	17.5%
Lithuania	*8.1%*	**42.2%**	**36.1%**	*8.6%*	*5.1%*	**46.4%**	17.0%	**34.7%**	*1.9%*	**31.1%**	**31.6%**	*6.2%*	**31.1%**
Romania	16.2%	**48.3%**	13.4%	16.2%	*5.8%*	**64.9%**	14.2%	15.8%	*5.2%*	**48.0%**	**30.5%**	*8.9%*	12.6%
EU11	20.7%	*9.2%*	20.5%	13.2%	**36.4%**	24.7%	22.1%	**31.3%**	22.0%	17.9%	28.2%	19.0%	**34.8%**
Austria	24.3%	14.9%	19.0%	14.4%	27.4%	26.0%	**31.4%**	26.7%	16.0%	18.1%	**37.6%**	16.9%	27.4%
Belgium	17.4%	10.1%	27.3%	14.5%	**30.7%**	**30.6%**	24.5%	**30.7%**	14.2%	21.5%	**33.2%**	18.1%	27.2%
Denmark	26.2%	15.0%	*9.9%*	26.7%	22.3%	**38.7%**	14.5%	27.7%	19.1%	29.6%	23.1%	13.8%	**33.4%**
Finland	17.8%	11.3%	**42.3%**	*3.1%*	25.5%	14.9%	14.7%	**60.5%**	*10.0%*	*9.4%*	20.0%	**30.1%**	**40.5%**
France	17.7%	*6.9%*	18.8%	13.9%	**42.8%**	24.2%	22.7%	26.5%	26.6%	17.7%	28.8%	17.2%	**36.4%**
Germany	23.0%	*8.4%*	17.7%	10.6%	**40.3%**	20.5%	28.0%	29.0%	22.6%	14.8%	**33.1%**	18.5%	**33.6%**
Italy	**33.6%**	16.5%	15.6%	15.0%	19.3%	**33.7%**	23.2%	21.7%	21.4%	26.5%	29.8%	14.3%	29.3%
Luxembourg	20.9%	*4.1%*	26.6%	*8.1%*	**40.3%**	**39.7%**	11.8%	23.2%	25.3%	**32.0%**	19.2%	14.6%	**34.2%**
Netherlands	12.1%	*4.9%*	24.4%	17.9%	**40.7%**	26.1%	10.0%	**39.8%**	24.1%	18.0%	17.1%	23.0%	**41.9%**
Sweden	21.1%	11.5%	**35.5%**	*5.7%*	26.3%	17.5%	24.1%	**38.9%**	19.5%	12.4%	28.9%	22.9%	**35.9%**
Utd. Kingdom	16.6%	*6.4%*	17.5%	11.5%	**48.0%**	17.6%	16.7%	**40.2%**	25.5%	12.7%	21.2%	23.6%	**42.6%**

Source: Authors' calculations based on the European Commission's Comext Database.

Table Codes: *Factor-input criterion*: 1 – mainstream, 2 – labour-intensive industries, 3 – capital-intensive industries, 4 – marketing-driven industries, 5 – technology-driven industries; *Labour-skill criterion*: 1 – low-skill industries, 2 – medium-skill/blue-collar industries, 3 – medium-skill/white-collar industries, 4 – high-skill industries; *Demand-dynamism criterion, taking in consideration the average growth of the considered industries for the years ranging from 1999 to 2002*: 1 – negative-growth industries, 2 – slow- or nil-growth sectors, 3 – medium-growth sectors, 4 – dynamic-growth sectors.

Note: EIS-values higher than 50% are highlighted in **red bold**, whereas EIS-values higher than 30% but lower than 50% are highlighted in **black bold**. In addition, EIS-values lower than 10% appear underlined and in *italic*.

Turning now into a more specific viewpoint, we will focus our attention in each one of the three groups of countries considered throughout this dissertation. Firstly, taking into consideration the *CEEC*, they can be divided in two main sub-

groups, CEEC1 and CEEC2, accordingly to their GDP *per capita* - Table III-1 -. The first group will be constituted by Slovenia, the Czech Republic, Hungary, Slovakia and Poland, whereas the second will be represented by Estonia, Lithuania, Latvia, Romania and Bulgaria. Poland would have been included in the second group by taking into account just the GDP *per capita* indicator. However, other factors such as its economic dimension (absolute GDP) counted in favour of Poland being included into the first group of CEEC.

It can be observed as regards to the factor-input criterion that the majority of the CEEC countries is still mostly specialised in *labour-intensive industries*. Indeed, amongst the 25 countries considered, the six that display the highest share in this kind of industries all belong to the CEEC (CEEC2 plus Poland).

However, the CEEC1 (excluding Poland), registers relatively low values on what concerns *labour intensive industries*, while simultaneously presenting relatively high weights when referring to *technology-driven industries* (including also Estonia in the latter). The Hungarian case deserves special attention regarding *technology-driven industries*, as it acquaint with the second highest weight in the whole EU25 (just below Ireland).

As regards to labour-skill criterion, the CEEC2 (mostly Romania and Bulgaria), turn out to be extremely dependant of *low-skill industries*. Poland and Estonia must be included and excluded once again from this group, respectively.. Furthermore, the Czech Republic, Hungary and Estonia display the highest share of *high-skill industries* and *white-collar workers*. Indeed, these three countries exhibit same-level values when compared to Denmark, Austria or Italy.

On the other side, the *blue-collar workers* predominate in Latvia, Poland, Slovenia and also Slovakia (occupying six of the first eight positions of the twenty-five countries considered). In addition, the *low-skill industries* represent a far-above the average value in Romania, Bulgaria and Lithuania.

Aiming at the analysis of the third of the criteria, namely the demand-dynamism criterion as regards the CEEC, three countries emerge as specialized in dynamic-growth sectors, namely Hungary, Estonia and Lithuania. Apart from

this, the majority of the CEEC seem to be specialising in *medium growth sectors*, with the only exceptions being Romania and Bulgaria, displaying relatively high values related to the *negative-growth sectors*.

Turning our analysis to the *CC*, it must be once again highlighted the to-some-point similarity registered by both Portuguese and Spanish trade patterns, both specialised *low- and medium-skill workers* and *negative- and slow-growth sectors* and exhibiting a highly diversified trade structure according to the factor-input criterion. In both cases, the relatively high values achieved by the technology-driven industries must also be highlighted, mostly in the Spanish case.

On the extreme sides, whereas Greece conciliates a majority of *low-skill industries* with a majority of *negative-growth industries*, Ireland, as it may be expected, exhibits extremely concentrated values in *technology-driven industries*, *high-skill workers* and *dynamic-growth sectors* (presenting the highest values in these three criteria as regards the whole EU25 universe, showing, once again, the huge concentration of the Irish productive and exporting structure in a reduced number of sectors characterised by *high-skill labour* and *technology-driven emphasis*).

On what specifically concerns the demand-dynamism criterion, Spain, Portugal and Greece exhibit similar values in medium- and dynamic-growth industries. Nonetheless, the picture clearly diverges when the negative- and slow-growth sectors are focused. Whereas Spain concentrates its exports mostly in the latter, Greece shows the highest concentration in negative-growth industries in the whole EU25 universe. In addition, Portugal acquainted with balanced values between these two kinds of sectors.

Referring to the *EU11-countries*, it must be concluded that the majority of them can be characterised as *technology-driven industries* (with the exception of the Finland and Sweden, both specialised in *capital-intensive industries*, and Denmark and Italy, specialised in *mainstream industries*), *white-collar workers* (mostly Finland, where this kind of industry represents more than 60% of total manufacturing exports) and, also as *dynamic-growth industries*

To sum up, taking a global view, the EU11 economies emerge as the trading core of the EU25, specialized in *technology-driven industries*, *white-collar workers* and *dynamic-growth sectors*. Nonetheless, the CC-CEEC set of countries does not display such a homogeneous picture. The Irish case beats all the EU11 countries, deserving special attention for that in section I.1.3, and some other countries exhibit a somehow approximate specialization, such as Spain, Slovakia, Slovenia, the Czech Republic and mostly Hungary. On the other hand, Latvia, Romania and Bulgaria lag far behind. Portugal, Greece, Poland, Estonia and Lithuania emerge in an intermediate picture.

Comparative Statics

In order to apply analogous sectoral taxonomies to dynamic results, the 4 700 sectors of the CN at the 6-digit level will be classified accordingly to their performance from 1999 to 2001 within the three criteria used in the previous section (Factor-Input or Labour-Skill criteria, according to PENEDER (2001), and also Demand Dynamism criterion). Thus, the following Table I-3 will allow us to understand the ongoing transformations suffered for the economies studied.

This table below allows us to achieve several remarkable conclusions. On what concerns the factor-input criterion, it can be observed how Ireland, the United Kingdom and Hungary have strongly increased their specialization in *technology-driven industries* in the period ranging from 1999 to 2002, consequently updating their intrinsic value-added. Note that all the CEEC1, plus Estonia, are increased the weight of their traded manufactures in technology-driven industries. This evolution confirms "*the gradual emergence of a specialisation that is no long in low value-added goods alone but also in goods with greater technological content*", as referred by HENRIOT & INOTAÏ (1998, pp. 102). On the contrary, all the CEEC2 also increased their specialization in *labour-intensive industries*, mostly Latvia and Romania.

It must be also referred that both the Spanish and Portuguese positions have remained relatively unchanged in the period considered.

Table I-3 – "Evolution of the relative weight in exporting values to EU15" in percentual points from 1999 to 2001 following PENEDER (2001)'s factor-input and labour-skill criteria and also demand-dynamism criterion (6-digit CN)

	Factor-Input Criteria					Labour-Skill Criteria				Demand-Dynamism Crit.			
Exp. Country	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
CC	-0.07	-0.47	0.39	0.11	**3.17**	1.21	1.11	1.38	0.80	0.68	1.59	0.42	1.82
Greece	-0.12	1.11	1.45	1.06	-0.37	**5.98**	-1.14	0.03	-0.37	**3.84**	0.99	-0.64	0.32
Ireland	-0.85	-1.13	-0.10	-0.16	**5.38**	-0.13	-1.08	2.40	**3.31**	-0.32	-0.91	1.01	**4.73**
Portugal	0.40	1.14	0.13	0.13	1.34	2.77	1.54	0.98	-0.79	2.03	2.17	0.29	0.02
Spain	0.33	-0.53	0.73	0.25	2.36	1.46	2.56	0.88	-0.40	0.83	**3.14**	0.10	0.43
CEEC	0.79	1.16	0.46	-0.52	1.26	1.63	1.84	1.34	-0.31	0.88	2.41	0.39	0.82
CEEC1	0.98	0.73	0.39	-0.61	1.65	1.07	2.16	1.45	-0.17	0.52	2.52	0.61	0.86
Czech Rep.	1.63	0.52	0.44	-0.66	1.20	0.87	2.09	1.21	0.34	0.38	2.33	0.68	1.11
Hungary	0.36	-0.09	-0.07	-0.69	**3.62**	0.44	1.67	2.42	-0.02	-0.01	2.03	0.85	1.64
Poland	0.77	1.66	0.51	-0.44	0.62	1.67	2.67	0.88	-0.72	0.95	**3.20**	0.37	-0.02
Slovakia	0.96	0.67	0.98	-0.67	1.19	1.46	2.16	1.24	-0.36	1.00	2.51	0.21	0.79
Slovenia	1.59	1.06	0.66	-0.73	0.56	1.36	2.31	1.23	-0.39	0.69	2.40	0.90	0.52
CEEC2	-0.08	**3.10**	0.76	-0.14	-0.51	**4.15**	0.39	0.87	-0.90	2.54	1.94	-0.60	0.62
Bulgaria	-0.13	2.27	2.04	-0.10	-0.95	**5.68**	-0.71	0.19	-0.65	**3.23**	1.70	-0.60	0.17
Estonia	-0.32	2.23	0.25	-0.73	1.70	1.19	1.23	**3.08**	-0.99	0.39	1.95	-0.56	2.72
Latvia	-0.66	**4.67**	1.17	-0.85	-1.19	1.92	**3.33**	0.38	-1.12	0.98	**4.24**	-1.09	0.38
Lithuania	-0.57	2.84	2.24	-0.52	-0.87	**3.26**	0.33	2.10	-1.19	1.74	1.79	-0.75	1.73
Romania	0.25	**3.46**	-0.03	0.25	-0.79	**5.11**	0.04	0.21	-0.86	**3.43**	1.67	-0.48	-0.11
EU11	0.69	-0.45	0.68	-0.05	2.27	1.09	0.84	1.76	0.82	0.42	1.45	0.53	2.11
Austria	1.06	0.12	0.52	0.07	1.36	1.22	1.76	1.30	0.22	0.43	2.39	0.32	1.36
Belgium	0.37	-0.37	1.36	0.08	1.69	1.69	1.08	1.69	0.05	0.78	1.94	0.44	1.35
Denmark	1.24	0.13	-0.39	1.29	0.85	2.50	0.08	1.40	0.53	1.59	0.94	0.01	1.97
Finland	0.41	-0.24	2.85	-1.06	1.17	0.12	0.10	**4.67**	-0.38	-0.44	0.63	1.63	2.68
France	0.39	-0.69	0.51	0.01	2.91	1.04	0.90	1.28	1.28	0.40	1.50	0.34	2.26
Germany	0.93	-0.53	0.40	-0.31	2.65	0.67	1.42	1.52	0.88	0.10	1.94	0.48	1.99
Italy	1.98	0.28	0.19	0.13	0.55	2.00	0.94	0.80	0.77	1.28	1.61	0.06	1.56
Luxembourg	0.72	-0.96	1.29	-0.57	2.65	2.59	-0.20	0.95	1.16	1.82	0.55	0.09	2.05
Netherlands	-0.16	-0.88	1.07	0.42	2.70	1.23	-0.37	2.61	1.04	0.43	0.33	0.93	2.81
Sweden	0.73	-0.22	2.17	-0.80	1.26	0.38	1.03	2.52	0.58	-0.14	1.52	0.91	2.21
Utd. Kingdom	0.29	-0.74	0.38	-0.22	**3.43**	0.39	0.29	2.65	1.18	-0.11	0.74	0.99	2.88

Source: Authors' calculations based on the European Commission's Comext Database.

Table Codes: *Factor-input criterion*: 1 – mainstream, 2 – labour-intensive industries, 3 – capital-intensive industries, 4 – marketing-driven industries, 5 – technology-driven industries; *Labour-skill criterion*: 1 – low-skill industries, 2 – medium-skill/blue-collar industries, 3 – medium-skill/white-collar industries, 4 – high-skill industries; *Demand-dynamism criterion, taking in consideration the average growth of the considered industries for the years ranging from 1999 to 2002*: 1 – negative-growth industries, 2 – slow- or nil-growth sectors, 3 – medium-growth sectors, 4 – dynamic-growth sectors.

Note: Differences higher than three percentual points are highlighted in **black bold**, whereas differences lower than minus three percentual points are highlighted in **red bold**.

On what concerns the labour-skill criterion, the vast majority of CEEC2 turn out to have firmly increased their dependence on *low-skill industries* (namely Greece and Bulgaria, both reaching more than 70% of total exports, Romania, over 65% of total exports, and Lithuania). In addition, the other

CEEC2, namely Latvia and Lithuania, have strongly increased their weight in blue-collar workers and white-collar workers, respectively.

Also remarkable is the Finnish performance, whose weight in white-collar workers' industries increased in almost five percentual points until reaching more than 60% of total exports, and, once again, the Irish increase in high-skill industries.

Finally, taking into consideration the demand-dynamism criterion, it must be highlighted the firm increase in the Irish weight in the *dynamic economies*, whereas strong increases in the Romanian, Bulgarianor Greek shares in the considered as *negative* and in the Latvian and Polish weights in the *slow-growth sectors, respectively,* are also noticeable.

I.1.5 Degree of Concentration of Trading Flows

After these first characterisations, it would be analytically important to additionally characterise each country's foreign trade structure in terms of its concentration in a low number of class products. In fact, high concentrations will have clear impacts on other indicators throughout this study, such as the indexes of commodities composition of trade that will be tackled in the second chapter of this first part.

For that purpose, a simple indicator of the concentration of trade flows was calculated using the European Commission's Comext Database, which takes into consideration the sum of the three leading class products in total exports at the two-digit level. Within this approach, Table I-4 gives the Export Concentration Ratios as well as the three leading categories of exports for each country, for the average period[35].

[35] Table III-8 also gives the Import Concentration Ratios as well as the three leading categories of imports for each country, for the average period. Indeed, almost all the countries of the sample present a similar pattern of concentration, characterized by the trilogy "Machinery and Mechanical Appliances", "Electrical Machinery and Equipment", "Vehicles other than Railway or Tramway" (Codes 84, 85 and 87) and, less often, "Mineral Fuels and Oil" (Code 27).

Table I-4 – Export Concentration Ratios (1999-2002 Average)

Exporting Country	Concentration of Exports Index	More Exported Product	2nd More Exported Product	3rd More Exported Product
Ireland	61,29%	84 - Machinery and Mechanical Appliances - 23,77%	29 - Organic Chemicals - 19,70%	85 - Electrical Machinery and Equipment - 17,83%
Hungary	57,60%	84 - Machinery and Mechanical Appliances - 25,17%	85 - Electrical Machinery and Equipment - 23,63%	87 - Vehicles other than railway or tramway - 8,79%
Finland	55,49%	85 - Electrical Machinery and Equipment - 25,28%	48 - Pape, Paperboard and articles made of - 18,82%	84 - Machinery and Mechanical Appliances - 11,39%
Luxembourg	50,49%	84 - Machinery and Mechanical Appliances - 17,78%	85 - Electrical Machinery and Equipment - 17,30%	72 - Iron and Steel - 15,42%
Fr Germany	49,28%	84 - Machinery and Mechanical Appliances - 18,92%	87 - Vehicles other than railway or tramway - 18,63%	85 - Electrical Machinery and Equipment - 11,73%
Estonia	48,75%	85 - Electrical Machinery and Equipment - 26,72%	44 - Wood and Articles made of wood - 14,72%	94 - Furniture, Lamps, Matress and Prefabricated Buildings - 7,31%
Latvia	47,28%	44 - Wood and Articles made of wood - 35,33%	72 - Iron and Steel - 6,06%	62 - Clothing and Apparel, not knitted - 5,89%
Sweden	46,20%	85 - Electrical Machinery and Equipment - 18,21%	84 - Machinery and Mechanical Appliances - 15,81%	87 - Vehicles other than railway or tramway - 12,18%
Czech Rep.	45,26%	87 - Vehicles other than railway or tramway - 15,71%	84 - Machinery and Mechanical Appliances - 15,18%	85 - Electrical Machinery and Equipment - 14,38%
Austria	43,02%	84 - Machinery and Mechanical Appliances - 17,63%	85 - Electrical Machinery and Equipment - 15,14%	87 - Vehicles other than railway or tramway - 10,25%
Utd. Kingdom	42,96%	84 - Machinery and Mechanical Appliances - 19,02%	85 - Electrical Machinery and Equipment - 15,08%	87 - Vehicles other than railway or tramway - 8,86%
Spain	39,74%	87 - Vehicles other than railway or tramway - 23,73%	84 - Machinery and Mechanical Appliances - 8,96%	85 - Electrical Machinery and Equipment - 7,05%
Slovakia	38,11%	87 - Vehicles other than railway or tramway - 19,75%	84 - Machinery and Mechanical Appliances - 9,52%	85 - Electrical Machinery and Equipment - 8,84%
Netherlands	37,27%	84 - Machinery and Mechanical Appliances - 17,16%	85 - Electrical Machinery and Equipment - 11,77%	27 - Mineral fuels and oils - 8,35%
Lithuania	36,97%	27 - Mineral fuels and oils - 21,21%	62 - Clothing and Apparel, not knitted - 8,88%	85 - Electrical Machinery and Equipment - 6,89%
France	36,06%	84 - Machinery and Mechanical Appliances - 13,21%	87 - Vehicles other than railway or tramway - 11,94%	85 - Electrical Machinery and Equipment - 10,90%
Italy	35,76%	84 - Machinery and Mechanical Appliances - 20,38%	87 - Vehicles other than railway or tramway - 8,36%	85 - Electrical Machinery and Equipment - 7,02%
Slovenia	35,66%	87 - Vehicles other than railway or tramway - 12,29%	85 - Electrical Machinery and Equipment - 12,23%	84 - Machinery and Mechanical Appliances - 11,14%
Portugal	35,40%	87 - Vehicles other than railway or tramway - 15,25%	85 - Electrical Machinery and Equipment - 13,01%	61 - Clothing and Apparel, Knitted - 7,14%
Romania	34,18%	62 - Clothing and Apparel, not knitted - 17,64%	85 - Electrical Machinery and Equipment - 8,37%	64 - Footwear - 8,16%
Belgium	30,20%	87 - Vehicles other than railway or tramway - 13,99%	84 - Machinery and Mechanical Appliances - 9,08%	71 - Precious and Semi-Precious Stones, Pearls and Imitation Jewelry - 7,14%
Denmark	29,85%	84 - Machinery and Mechanical Appliances - 13,19%	85 - Electrical Machinery and Equipment - 10,78%	27 - Mineral fuels and oils - 5,88%
Poland	29,67%	85 - Electrical Machinery and Equipment - 10,62%	84 - Machinery and Mechanical Appliances - 9,87%	87 - Vehicles other than railway or tramway - 9,18%
Greece	26,05%	27 - Mineral fuels and oils - 11,24%	61 - Clothing and Apparel, Knitted - 9,55%	76 - Aluminium and Articles made of - 5,26%
Bulgaria	25,54%	62 - Clothing and Apparel, not knitted - 9,84%	27 - Mineral fuels and oils - 8,51%	99 - Other Products - 7,19%

Source: Authors' calculations based on the European Commission's *Comext* Database, downloaded in November 2003 [36]

It can be observed that Ireland presents, by far, the most concentrated exporting structure. Indeed, just the three more successful exporting sectors, namely "Machinery and Mechanical Appliances" (Code 84), "Organic Chemicals" (Code 29) and "Electrical Machinery and Equipment" (Code 85), represent more than 60% of total exports.

[36] Bulgaria presents a high 99-class due to the lack of rigour showed by the frontiers' authorities in classifying the traded products, which has been repeatedly referred by the EUROPEAN COMMISSION (2003c) as one of the aspects to improve before its adhesion to the EU25, expected for 2007.

Equally, some Central and Eastern European Countries present a highly concentrated exporting structure. Hungary and the Czech Republic concentrate respectively 58% and 45% of total exports in "Machinery and Mechanical Appliances", "Electrical Machinery and Equipment" and "Vehicles other than Railway or Tramway", a similar pattern to the Irish one.

However, both the Estonian and the Latvian situation must be highlighted. In both cases, the wood industry plays an important role and causes their concentration indexes to be close to 48% of their total exports.

On the opposite side, the least concentrated patterns of exports belong to Belgium, Denmark, Poland and, mostly, Greece and Bulgaria, as showed above.

These results are, in a certain measure, coherent with the principle according to which the smallest countries tend to be specialised in a relatively narrow product range, whereas large countries can more easily specialise themselves in a wide range of commodities. This belief, considered to be a good approximation for the effect of economies-of-scales, was empirically proved by BEERS & BIESSEN (1996, pp. 5) and KALBASI (2001, pp. 5), after the theoretical work carried out by LINNEMANN (1966). Nevertheless, this is not a perfect constatation as it is not the only factor to take into account.

CHAPTER II - ANALYSIS OF THE BILATERAL COMMODITY COMPOSITION OF TRADE IN MANUFACTURES INVOLVING THE CEEC AND THE EU15 FOR THE PERIOD 1999-2002

After having analysed both the recent trends and the foreign trade structures of the CC and the CEEC, the main object of study throughout this chapter will be the analysis of the Commodity Composition of Trade (CCT) in terms of manufactures involving the CEEC and the EU15 members during the period ranging from 1999 to 2002.

We will observe throughout this section that few studies take into account detailed information about the commodity structure of manufactures trading flows, i.e., the measure of the complementarity between the symmetric trade vectors of pairs of countries. Particularly, none of them pay any attention to the CEEC nor the CC when considering the recent enlargement. Several CCT variables will, therefore, be tested for the available data paying special attention to their relatively substitutive items in terms of higher levels of decomposition.

Moreover, we will carry out two simultaneous analyses. First of all, we will take into consideration those bilateral trading flows involving both the CEEC and the UE15 for the average values observed for the period ranging from 1999 to 2002. The analysis related to the comparative statics between years 1999 and 2002 will be tackled afterwards. The latter will supply a complementary perspective of the pure static analysis followed in first place, since it will illustrate the general trend verified during those several years.

Within this approach, a Panel Data was built for the period 1999-2002 using the European Foreign and Internal Trade Data withdrawn from the *Eurostat's Data Base* known as *Comext* for those years, as a priceless starting source of information. It presents several highly decomposed levels of information and we opted to use both the Comext's 2-digit and 6-digit Combined Nomenclature (CN) as regards to the manufacture industries (covering 84 and 4 701-product categories, respectively). Note equally that the selection of the

chronological range above was strongly conditioned by the fact that 1999 was the first year in which the *Eurostat* compiled methodologically harmonised data for the EU25-members. Starting from this data, it is possible to build detailed information relatively to the CCT as one of the factors determining the intensity of trade[37] between a pair of trade partners.

Two major variables have been used as regards to the CCT measure, namely the Cosine Measure (COS) and the Export-Import Similarity Index (EIS). Both of them indicate a trade probability and also an expected intensity of trade between a pair of countries and, therefore, both of them will be considered in this study.

However, it would be appealing to start this chapter by analysing the existent literature review, which is done in the *first stage*. This will allow us to theoretically understand and contextualise each one of the measures considered. The unavoidable comparative analysis of both Trade Similarity Indexes (TSI) will be tackled afterwards in the *second stage* of this chapter, contributing for the inherent analytical division between the several authors at this respect.

In the *third stage* of this chapter, the static empirical results obtained for the 1999-2002 average period will be presented, followed by the complementary comparative-static results covering the evolution experienced by these two trade similarity indexes between 1999 to 2002, allowing for a comprehensive analysis of the current situation. This challenge will be tackled in the *fourth stage*.

Lastly, special attention will be paid, in the *fifth section* of this chapter, to the results obtained as regards to the specific similarities of the bilateral trading flows involving both the CEEC and the CC.

I.2.1 Literature Review

As already referred above, two trade similarity indexes have been mainly used in order to assess the bilateral export-import possibilities based on their Commodity Composition of Trade structure, which will be developed throughout

[37] Note that what we are referring to in this study is the expected, rather than actual, intensity of trade.

this section. Alternatively, other indexes could have also been used either related to the estimation of the extent of intra-industry trade, such as the GRUBEL & LLOYD (1975) Index, or to measuring total comparative advantages, such as BALASSA's Revealed Comparative Advantage Index (1965), MICHAELY's Index (1962) or ARCHIBUGI & PIANTA's Chi-Square Measure (1992)[38].

Keeping in mind the wish to deeply scrutinise the trade similarity indexes, we would firstly refer that the more widely known index is the so-called *Cosine measure* (COS) index. Originally created by ALLEN (1957) as "*the cosine of the angle between the vector of country i exports and the vector of country j imports in an n-dimensional commodity space*", it was developed and firstly affected to applied trade economics by LINNEMANN (1966) and, lately, it has been used in several trade studies[39] (although very few of them incorporate the COS variable into gravity equations[40]).

Within this measure, a small angle between two commodity vectors implies the commodity composition of exports of country i to all destinations to be similar to the commodity composition of imports of country j from all origins. On the opposite, a large angle implies both structures to be dissimilar.

Mathematically, the magnitude of this angle may conveniently be measured in terms of its cosine. Indeed, ALLEN (1965, pp. 434-435), using a vector's internal product analysis, showed that two vectors $a = (a_1, a_2)$ and $b = (b_1, b_2)$, within the Euclidian space, are said to be the similar the closer the value of the cosine of the angle between them is to one and the more distant is from zero.

[38] See LAURSEN (1998) for a deep comparison of these three latter indicators.
[39] See LINNEMANN (1985) or ABDALLA (1997) as some examples.
[40] See HUFBAUER (1970), LINNEMANN & BEERS (1988), BEERS & LINNEMANN (1992), BEERS & BIESSEN (1996), ARNON, SPIVAK & WEINBLATT (1996), LIMAM & ABDALLA (1998) and LAMOTTE (2002) as examples.

Equation I-1 – Allen's Original COS measure

$$Cos\,\theta = \frac{a.b}{|a|.|b|} = \frac{a_1.b_1 + a_2.b_2}{\sqrt{\left(a_1^2 + a_2^2\right).\left(b_1^2 + b_2^2\right)}}$$

In fact, if the commodity composition of the exports of country i is identical to that of the imports country j, i.e. if the two vectors differ only by a scalar (a = λ.b), the COS measure is equal to the unity and the commodity patterns of the exporting and the importing country match perfectly. However, if one vector or another is zero, obviously no trade from country i to country j is possible and both vectors are orthogonal, with their COS equalling to zero. Note that COS is an ordinal measure, i.e. it ranks items within a given collection from highest to lowest without measuring their magnitudes.

Categorically, the author himself declared, after the construction of this measure, that "*a wide area of study was henceforth unlocked*". Indeed, following this first approach, LINNEMANN (1966) continued ALLEN's work eight years later.

Equation I-2 – Linnemann's COS measure

$$COS_{ij} = \frac{\sum_k x_{ik}.m_{jk}}{\sqrt{\sum_k x_{ik}^2 . \sum_k m_{jk}^2}}$$

where x_{ik} equals multilateral exports of commodity *k* by country *i* to the rest of the world and m_{jk} equals multilateral imports of commodity *k* by country *j* from the rest of the world.

Either the exportation vector of the country i (x_{ik}) or the importation vector of the country j (m_{ik}) are composed by n elements (k = (1, … , n).

Therefore, given the decomposed vectors of economy i's exports and economy j's imports, the greater is the similarity between the two vectors, the greater is the potential for exports from country i to country j.

Note that the equality $COS_{ij} = COS_{ji}$ is quite improbable, since if country i presents, for instance, no export possibilities to country j, this does not

mechanically mean that country j has no export possibilities to country i[41]. Furthermore, also note that the comparison of the exportation vector of one country with its own import vector, known as COS_{ii}, is a useful indicator of the intra-industry trade[42]. Hence, the higher this indicator is, the higher the possibilities for intra-industry trade since its trade package is more dominated by commodities with product differentiation.

Reference should be equally made to the sensibility bore by the COS-measure as regards to the decomposition degree, in the sense of decreasing its value following a higher degree of decomposition. Finally, it should be remarked how the COS definition resembles that of the correlation coefficient. Indeed, it can also be easily shown that the larger the amount of decomposed commodity classes, the closer COS approaches the correlation coefficient, with the exception that it cannot take a negative value.

An alternative to the COS index is the so-called *Export-Import Similarity measure* (EIS) index. Originally created by MACDOUGALL (1951, 1952) for the analysis of the bilateral comparative advantage between the British and the American exports, it was described as the ratio of the product by product elasticity of substitution in demand between imports from two different sources to the aggregate (across all products) elasticity of substitution of imports from those sources.

Equation I-3 – MACDOUGALL's EIS measure

$$B_{(a,b)} = \frac{\xi_{i(a,b)}}{\sum_{i} \xi_{i(a,b)}}$$

where $\xi(a,b)$ equals the product-by-product elasticity of substitution in demand between imports from countries *a* and *b* relatively to the commodity *i*.

[41] For a better understanding of this phenomenon, see LINNEMANN (1966, pp. 147).
[42] See LINNEMANN & BEERS (1988) and BEERS & BIESSEN (1996) as a reference.

The EIS measure was further expanded and firstly affected to applied trade economics by FINGER & KREININ (1979), namely to the comparison of the export pattern of different countries *a* and *b* to a third-country importing market *c*. These authors proposed a different approach to MACDOUGALL's index as they concluded that the latter was "*sensitive to the relative scale of exports of the two exporters, tending towards unity when one exporter is notably larger than other*" (1979, pp. 906).

Equation I-4 – FINGER & KREININ's measure

$$S_{(ab,c)} = \left\{ \sum_i Minimum\left[X_i(ac), X_i(bc)\right] \right\}.100$$

where $x_i(ac)$ equals the share of commodity i in country *a*'s exports to *c* and $x_i(bc)$ equals the share of commodity i in country *b*'s exports to *c*.

More recently, this measure was also applied to trade economics by POMFRET (1981) and TOVIAS & DAFNI (2001), aiming at the potential trade diversion generated either by the accession of Greece, Portugal and Spain to the EEC or by the more recent accession of the CEEC to the EU15, respectively, for the so-called Northern African-Mediterranean Countries. On what concerns the first bibliographic reference mentioned above, KELLMAN & SCHRODER (1983) fascinatingly tested the robustness of this EIS indicator when faced with the various levels of commodity aggregation and with time, proving to be quite a robust measure.

Interestingly, FINGER & KREININ set up a relative (not absolute) index, which was immune to absolute magnitudes of values, and, furthermore, requiring only international trade data (1979, pp. 905), resulting in an extra advantage of the EIS index when compared with MACDOUGALL measure[43].

[43] Obviously, this sort of data is easily available on a standardised basis for all countries.

More recently, a variant of the FINGER & KREININ measure has been used in several trade studies[44] following the pattern below, although very few of them incorporated it into gravity equations[45]:

Equation I-5 – EIS measure adapted from FINGER & KREININ's measure

$$EIS_{ij} = \sum_k \min\left[\frac{x_{ik}}{\sum_k x_{ik}}, \frac{m_{jk}}{\sum_k m_{jk}}\right]$$

where x_{ik} equals multilateral exports of commodity *k* by country *i* to the rest of the world and m_{jk} equals multilateral imports of commodity *k* by country *j* from the rest of the world.

Note that the above EIS index differs form the previous FINGER & KREININ EIS measure – Equation I-4 – in one critical respect. Whereas the latter compares two export vectors covering trade with a particular common importer only, the EIS index follows a bilateral and reciprocal approach of trade flows making use of trading vectors covering total exporting and importing trade.

The two key terms are again the elements of both the country i's exporting vector and the country j's importing vector, respectively, but rescaled in a way that, *per vector*, the elements add up to unity. Therefore, for each k, the overlap is determined by selecting the smaller of the two elements, giving the overall summation over k the measure of overall similarity.

Finally, it would be interesting to make a brief reference to the fact that the EIS index is closely related to the GRUBEL & LLOYD (1975) intra-industry trade index in its amended form by AQUINO (1978)[46], from a conceptual point of view, as it can be observed from the comparison between Equation I-5 and Equation I-6. Indeed, this idea is also defended by POMFRET (1981, pp. 727)).

[44] See KÖSEKAHYAOGLU (1994) as an example.
[45] See LINNEMANN & BEERS (1988) and BEERS & LINNEMANN (1992) as examples.
[46] However, the usefulness of the AQUINO amendment is questionable (see GREENAWAY & MILNER (1981)).

Equation I-6 – GRUBEL & LLOYD's Intra-Industry Trade Index in its Amended Form by AQUINO

$$Q_{ij} = \left[\frac{\sum_{i=1}^{n}(X_i + M_i) - \sum_{i=1}^{n}\left|X_i^e - M_i^e\right|}{\sum_{i=1}^{n}(X_i + M_i)} \right] \times 100$$

where: $X_i^e = \frac{X_i}{2} \times \frac{\sum_{i=1}^{n}(X_i + M_i)}{\sum_{i=1}^{n} X_i}$ and $M_i^e = \frac{M_i}{2} \times \frac{\sum_{i=1}^{n}(X_i + M_i)}{\sum_{i=1}^{n} M_i}$.

Note that X_i equals the multilateral exports of commodity *k* by country *i* to either all the world or one specific country and M_j equals multilateral imports of commodity *k* by country *j* also to either all the world or one specific country, respectively.

Furthermore, after this theoretical framework, it would be enlightening to draw comparative attention to some intrinsic characteristics of the two sets of COS and EIS measures. This will be done in the following section.

I.2.2 Comparative Analysis of Trade Similarity Indexes

As a starting approach, the *main similarities* between these two measures must be referred. Thus, as the COS measure does, the EIS also varies between zero, representing no similarity or correspondence at all, and unity, meaning perfect correspondence. Note also that both measures are extremely sensitive to the level of decomposition of the data, in the sense that increasing the amount of commodity classes will tend to lower the numerical value of both COS and EIS measure (as it can be observed in Table I-5).

As to their economic interpretation, it should also be noted that both measures give an indication of the probability of trade between the exporting and the importing country according to their similarity in terms of complementary trade flows. Therefore, both measures yield a yardstick for the expected intensity of bilateral trade that, complemented with the other variables used in the gravity equation, may be used in a statistical explanation to the actual intensity of

bilateral trade. Indeed, this complementary analysis will be tackled in the last part of this dissertation.

Finally, it should be highlighted that both indexes are usually correlated series, as we would expect from two measures with such a similar construction. In spite of this, additional attention must be paid to the existing *main differences* between them.

Thus, a first and foremost comparative comment concerns the systematic difference between the measures' respective results, firstly pointed out by LINNEMANN & BEERS (1988), but also by BEERS & LINNEMANN four years later related to the North-South world trade relations[47].

To explain this standpoint, whereas COS has non-linear properties, EIS is a linear construction. As a result, an extremely strong/poor correspondence in a commodity class k would score relatively stronger/poorer results according to the COS measure than relatively to the EIS index. Hence, the variance of COS series will be larger than that of EIS series, especially when trade shows a high commodity concentration[48], in which case COS yields higher numerical values than EIS due to the non-linear properties of the former. Table I-5 allows us to observe the figures obtained from the comparison between both measures when applied to our trading data[49].

Secondly and as already mentioned, whereas the EIS is a rescaled measure, making use of relative data for its calculations, COS makes use of absolute figures. Therefore, these two outcomes have clear effects both on the final average EIS-values and the final average COS-values, as can be observed in Table I-5 below.

[47] Unexpectedly, these are the two only works treating both measures together.
[48] As it would happen in the case of Ireland, for instance. For further details, turn to Table I-4.
[49] It is not clear how GRUBEL & LLOYD (1975, pp. 28) reached a different conclusion when comparing COS with their linear original measure, but both LINNEMANN & BEERS (1988, pp. 455) and BEERS & LINNEMANN (1992, pp. 183) obtained, from their results, clear implications that support our conclusions.

Table I-5 – Mean and Volatility of both indexes, measured by the simple arithmetic average and the variance of their results (1999-2002 Average for either 2-digit and 6-digit *Comext*'s CN)

2-digit Comext's NC Nomenclature				6-digit Comext's NC Nomenclature			
COS	Average		EIS	COS	Average		EIS
COSij Exp. Countries	0.7336	0.6229	EISij Exp. Countries	COSij Exp. Countries	0.4194	0.3769	EISij Exp. Countries
COSij Imp. Countries	0.7336	0.6229	EISij Imp. Countries	COSij Imp. Countries	0.4194	0.3769	EISij Imp. Countries
Intra-Trade COSii	0.8342	0.7068	Intra Trade EISii	Intra-Trade COSii	0.5622	0.4639	Intra Trade EISii
COS	Variance		EIS	COS	Variance		EIS
COSij Exp. Countries	0.0244	0.0104	EISij Exp. Countries	COSij Exp. Countries	0.0178	0.0119	EISij Exp. Countries
COSij Imp. Countries	0.0029	0.0007	EISij Imp. Countries	COSij Imp. Countries	0.0033	0.0006	EISij Imp. Countries
COSii	0.0263	0.0140	EISii	COSii	0.0412	0.0218	EISii

Lastly, it is observed that the extreme values per exporter are not necessarily obtained with the same trade partners in both cases. In fact, just in 29 out of 50 cases the "best" or "worst" partner is the same according to both measures as regards to the 2-digit CN calculations (9 out of 50 cases as regards to the 6-digit CN). The conclusion is still applicable when taking into consideration the extreme values per importer (33 out of the same 50 cases as regards to the 2-digit CN calculations and 19 out of 50 cases as regards to the 6-digit CN) and it illustrates the difference in statistical properties between the two measures.

As a consequence of these differences, LINNEMANN & BEERS (1988, pp. 455) refer that "*EIS performs better than COS*", whereas BEERS & LINNEMANN (1992, pp. 182) refer that "*in spite of obtaining similar results to some extent, better results are obtained with EIS than with COS, an outcome that may partly be due to the relatively larger variance in the COS measure itself*".

To sum up, due to the higher sensibility of the COS-measure to advanced levels of trade data decomposition, we will refer exclusively to the 6-digit CN EIS-values for the purpose of making conclusions from here henceforth. However, all the 6-digit CN COS-values are object of a parallel calculation, which can be found on the annexes at the end of this dissertation[50].

[50] Moreover, all 2-digit CN EIS and COS-values are available under request, since their inclusion into the annexes would mean a simultaneously strong and unnecessary increase of size.

I.2.3 Static Empirical Results obtained for the Average Value of the period ranging from 1999 to 2002

We will now pay attention to the static empirical results obtained as regards to the average of the period ranging from 1999 to 2002. In this respect, we consider that the arithmetic average of either a country's COS or EIS indexes with respect to all its partner countries provides some extra information in relation to the strength of its market role, as suggested by BEERS & LINNEMANN (1992, pp. 191-193). Within this approach, an exporting country with a supply vector that matches well the demand vector of many importers is likely to be in a stronger position, especially if its export structure corresponds well to the import needs of large importers, as opposed to an exporter with a poorly matching export structure.

Alternatively, a weighted average may be introduced instead of a simple one (giving a longer weight to the more recent years) aiming at an updated picture of the current situation. We used both methods but the results obtained regarding the latter did not alter the previous conclusions obtained.

However, it must also be borne in mind that analysing the Commodities Composition of Trade must simultaneously be a static and dynamic task. Consequently, in the following section, the analysis carried out during this section will be complemented by the scrutiny of the comparative-static relation observed between the 1999 and the 2002 pictures described.

As a starting point, we present the mean, maximum and minimum values of the EIS measure for the considered twenty-five countries making use of the 6-digit Comext's CN as regards to the average period ranging from 1999 to 2002, in view of either importing countries or exporting ones. In addition, a simultaneous and deeper scrutiny would allow us to discriminate between different groups of trading partners, aiming at the establishment of specific and, perhaps, special relations with the CC, the CEEC or the EU11 as a whole. This analysis can be observed in Table I-6.

Therefore, we will consider all sectors of the CN at the 6-digit level of decomposition that, according to the conversion CN-NACE, are classified as manufacturing industry sectors. Hence, we define our object of study within the manufacturing sectors (4 700 sectors), but avoiding analyses of the agricultural and fishering sectors, according to BEERS & LINNEMANN (1992). In fact, these sectors will not be included in the calculation of EIS/COS measures, as the degree of inefficient production is elevated, due to higher prices, lower quality product and/or trade barriers, which are far above the ground in the context of the Common Agricultural Policy[51].

In addition, it must also be mentioned that services are deliberatively left away of this dissertation, particularly due to both the lower levels of disaggregation and the specific problems of measurement that these sectors present.

It should be also stated that the figures presented below cannot be compared to the results obtained by other studies such as LINNEMANN & BEERS (1988), BEERS & BIESSEN (1996) or LAMOTTE (2002), due to the fact that the sample of countries, the periods of time and the product-class decomposition are different.

Table I-6 shows that countries with a relatively weak average EIS as an importer (lower than 0.36) are Lithuania, Bulgaria, Hungary, Luxembourg, Ireland and Romania. These results imply, on one side, that their external trade necessities are comparatively less similar to the exporting characteristics of their EU25 partners (as it happens mostly in the cases of Lithuania and Romania, concentrated in "Mineral Fuels and Oils" (Code 27), which the EU25 is not able to supply – See Table III-8). On the other hand, the above mentioned results can imply that their import flows are concentrated on a few product categories (as it happens mostly in the cases of Ireland or Hungary, concentrated in "Electrical Machinery and Equipment" and "Machinery and Mechanical Appliances").

[51] In addition, codes being considered as extremely heterogeneous will be analogously vanished from the 6-digit NC Comext's Nomenclature, namely confidential flows and also codes 97, 98 and 99.

Additionally, however, it can also be the result of a combination of both factors, as it happens in the cases of Luxembourg and Bulgaria.

Table I-6 – EIS_{ij} mean, maximum and minimum values for importing countries (1999-2002 Average and 6-digit Comext's CN)

Importing Country	Total Average	Cohesion C. Average	CEEC Average	Rest of EU Avg.	Maximum	Minimum
Austria	0,4176	0,3694	0,3608	**0,4938**	0,6641 - Germany	0,2294 - Ireland
Germany	0,4058	0,3757	0,3451	**0,4786**	0,6118 - France	0,2188 - Latvia
Sweden	0,4026	0,3638	0,3334	**0,4873**	0,6338 - Germany	0,2143 - Latvia
Denmark	0,4017	0,3566	0,3424	**0,4791**	0,5722 - Germany	0,2363 - Luxembourg
Finland	0,3962	0,3464	0,3191	**0,4931**	0,6129 - Germany	0,2047 - Latvia
Slovenia	0,3949	0,3527	0,3431	**0,4526**	0,5768 - Germany	0,1939 - Ireland
Portugal	0,3912	0,3788	0,3195	**0,4598**	0,6064 - Spain	0,2139 - Latvia
France	0,3909	0,3674	0,3162	**0,4751**	0,6443 - Germany	0,2088 - Latvia
Spain	0,3902	0,3054	0,3157	**0,4811**	0,6437 - Germany	0,2017 - Latvia
United Kingdom	0,3897	0,3757	0,3177	**0,4673**	0,6066 - Germany	0,2117 - Latvia
Italy	0,3886	0,3685	0,3154	**0,4698**	0,6230 - Germany	0,2076 - Latvia
Czech Republic	0,3845	0,3323	0,3048	**0,4687**	0,6237 - Germany	0,1978 - Latvia
Poland	0,3834	0,3373	0,3009	**0,4677**	0,6136 - Germany	0,2048 - Latvia
Belgium	0,3815	0,3647	0,3173	**0,4524**	0,5851 - Germany	0,2125 - Luxembourg
Slovakia	0,3717	0,3213	0,3173	**0,4345**	0,5622 - Germany	0,2058 - Latvia
Estonia	0,3712	0,3249	0,3281	**0,4233**	0,5012 - Germany	0,2069 - Ireland
Latvia	0,3711	0,3317	0,3272	**0,4214**	0,4890 - Germany	0,2178 - Luxembourg
Greece	0,3703	0,3653	0,3120	**0,4247**	0,5246 - Spain	0,2080 - Luxembourg
Netherlands	0,3657	0,3613	0,3000	**0,4330**	0,5676 - United Kingdom	0,2093 - Latvia
Lithuania	0,3561	0,3211	0,3066	**0,4094**	0,5102 - Germany	0,2087 - Luxembourg
Bulgaria	0,3540	0,3280	0,2943	**0,4123**	0,5218 - Germany	0,1922 - Latvia
Hungary	0,3442	0,3046	0,2799	**0,4112**	0,5384 - Germany	0,1753 - Latvia
Luxembourg	0,3395	0,3082	0,2867	**0,4048**	0,4796 - Germany	0,1938 - Latvia
Ireland	0,3326	0,3242	0,2629	**0,3983**	0,5280 - Netherlands	0,1822 - Latvia
Romania	0,3270	0,2957	0,2738	**0,3819**	0,4761 - Germany	0,1859 - Luxembourg

Source: Authors' calculations based on the European Commission's Comext Database.

Note: The highest EIS-value achieved between the groups of countries CEEC, CC and EU11 are highlighted in **bold** (note that these always correspond to EU11).

In the same line of reasoning as other authors[52], we empirically prove that excessive imports concentration in a low number of class products lead to the decrease of the import possibilities, as the probability of a good matching with the export vector of the exporting country is smaller.

On the opposite hand, the so-called Scandinavian countries, Austria, Germany, France, and, interestingly the CC Portugal and Spain and the CEEC Slovenia present a relatively high average EIS (higher than 0.39). As a consequence, their importing needs appear to be adequately satisfied by the products that the EU25 has to offer within its Internal Market and therefore its

[52] See for instance LINNEMANN & BEERS (1988, pp. 448) or ABDALLA (1997, pp. 7).

membership to the EU itself appears to bring about relatively more trade creation than trade diversion.

Nevertheless, it must also be borne in mind that this study does not intend to focus on neither of VINER's concepts, namely the trade diversion effect nor the trade creation effect (1950)[53]. In fact, this dissertation's aim could be considered to be only a part of the trade creation effect, since we avoid any considerations in terms either of consumer or producer surplus[54].

Taking as starting point each one of the three blocks of countries that are the object of this analysis, namely the CEEC, the CC and the remaining EU11, we can conclude that there are not homogeneous groups. However, it is interesting to conclude that the CEEC Slovenia (and perhaps also the Czech Republic and Poland) already present a "mature" demand structure, analogous to that presented by the more developed EU25 countries and characterised by "Machinery and Mechanical Appliances", "Electrical Machinery and Equipment" and "Vehicles Others than Railway or Tramway".

As a final consideration, it must be highlighted that only two of the twenty-five countries present a CC as its most adequate supplier, namely Portugal and Greece, supplied by the Spanish exporting structure. Furthermore, no CEEC appears as the best supplier for any of the EU25 countries.

On what concerns the exporting flows, the figures of the Table I-7 show us the opposite and simultaneously complementary figures to the previous table. As expected, the big-five economies of the EU, jointly with Belgium and the Netherlands, emerge here as the most prepared economies facing the Internal

[53] For this purpose, it must be stated that trade diversion would be important if and only if non-EU25 countries export the same type of manufactures as CEEC to the EU25 Internal Market. Therefore, if exports are dissimilar between third countries and CEEC, then there would be little scope for trade diversion. For more information on this approach and its respective conclusions, see, for instance, AITKEN (1973), FINGER & KREININ (1979), POMFRET (1981), KELLMAN & SCHRODER (1983), KÖSEKAHYAOĞLU (1984), BEERS & LINNEMANN (1992), TOVIAS & DAFNI (2001) or SILVA & TENREYRO (2003, 2004).

[54] Within this statement, the analysis carried out by BAYOUMI & EICHENGREEN (1995), where they found that the Spanish and Portuguese adhesion to the EEC was overwhelmingly trade creating, must be highlighted.

Market as a whole, in terms of trade specialisation, as they present a relatively high average EIS (higher than 0.48).

The special role played by some CEEC as exporters, such as Slovakia, Hungary, Slovenia, Poland and, mostly, the Czech Republic (higher than 0.34) can also be observed. Indeed, their average EIS-measure as exporting countries has shown that these five countries have better export possibilities within the EU than Finland, Luxembourg, Portugal, Greece or Ireland. In the case of the Czech Republic, its EIS-measure is also higher than the Swedish or Danish analogue figure.

On the other hand, a second group of CEEC, constituted by Bulgaria, Romania and the three Baltic countries, appears to have a relatively wrong trade specialisation for tackling the challenge of the EU Internal Market. Indeed, as BEERS & BIESSEN (1996, pp. 2) referred and that can still be applied with relation to these five countries, "*export flows from the East to the West depend on their ability to generate competitive export goods which must be able to match the import needs of the Western countries. This (...) also requires a shift in the commodity structure of foreign trade, as the inherited export structure of the countries in transition may not fit the import needs of the Western counterparts*".

Last, but not least, the CC appear not to be in a favourable situation to face this enlargement, at least in trading terms regarding their CCT structures. Within this block of countries, their individual patterns of specialisation are much more unfavourable than the average of the EU, being Spain the only exception. The Irish case is unique due to the enormous concentration of its exports in a low number of products, as referred above.

Table I-7 – EIS_{ij} Mean, maximum and minimum values for exporting countries (1999-2002 Average and 6-digit Comext's CN)

Exporting Country	Total Average	Cohesion C. Average	CEEC Average	Rest of EU Avg.	Maximum	Minimum
Germany	0.5647	0.5470	0.5414	**0.5950**	0,6641 - Austria	0,4655 - Ireland
France	0.5309	0.5432	0.4932	**0.5637**	0,6167 - Spain	0,4325 - Romania
United Kingdom	0.5205	0.5255	0.4796	**0.5594**	0,6012 - France	0,4315 - Romania
Spain	0.4971	0.5141	0.4693	**0.5178**	0,6064 - Portugal	0,4052 - Romania
Italy	0.4957	0.4905	0.4893	**0.5041**	0,5683 - Austria	0,3867 - Luxembourg
Belgium	0.4933	0.5000	0.4647	**0.5192**	0,5594 - Italy	0,3958 - Romania
Netherlands	0.4826	0.4903	0.4468	**0.5153**	0,5502 - Germany	0,4007 - Romania
Austria	0.4429	0.4160	0.4464	**0.4502**	0,5186 - Czech Republic	0,3541 - Ireland
Czech Republic	0.4366	0.4152	0.4368	**0.4443**	0,5239 - Austria	0,3413 - Ireland
Sweden	0.4324	0.4167	0.4239	**0.4471**	0,5028 - Finland	0,3498 - Ireland
Denmark	0.4094	0.4030	0.3989	**0.4224**	0,4728 - Austria	0,3659 - Romania
Poland	0.3864	0.3798	0.3827	**0.3918**	0,4539 - Austria	0,3154 - Ireland
Hungary	0.3728	0.3661	0.3478	**0.3958**	0,4393 - Germany	0,2905 - Romania
Slovakia	0.3538	0.3388	0.3445	**0.3670**	0,4124 - Slovenia	0,2753 - Ireland
Slovenia	0.3455	0.3365	**0.3475**	0.3471	0,4129 - Austria	0,2731 - Ireland
Portugal	0.3435	0.3397	0.3208	**0.3650**	0,4000 - Austria	0,2848 - Romania
Finland	0.3194	0.3044	0.3153	**0.3296**	0,3783 - Denmark	0,2823 - Romania
Greece	0.2907	0.2867	**0.2939**	0.2890	0,3416 - Latvia	0,2458 - Hungary
Lithuania	0.2648	0.2550	0.2639	**0.2691**	0,3191 - Latvia	0,2195 - Hungary
Bulgaria	0.2643	0.2541	0.2587	**0.2727**	0,3099 - Slovenia	0,2140 - Ireland
Romania	0.2616	0.2486	0.2529	**0.2734**	0,3148 - Slovenia	0,2050 - Ireland
Estonia	0.2428	0.2250	0.2353	**0.2554**	0,3035 - Denmark	0,2097 - Ireland
Ireland	0.2416	0.2332	0.2159	**0.2674**	0,3639 - Netherlands	0,1939 - Slovenia
Luxembourg	0.2191	0.2142	0.2118	**0.2284**	0,2438 - Austria	0,1859 - Romania
Latvia	0.2100	0.2060	0.2062	**0.2145**	0,2426 - Lithuania	0,1753 - Hungary

Source: Authors' calculations based on the European Commission's Comext Database.

Note: The highest EIS-value achieved between the CEEC, the CC and the EU11 is highlighted in **bold**.

Apart from these first conclusions, several other interesting paths of analysis are open by LINNEMANN & BEERS (1988, pp. 456), who added to their conclusions a couple of advises for future studies making use of EIS measure, namely those suggesting a comparative analysis of existent unbalances between the results obtained making use either of EIS_{ij} or EIS_{ji} measures or the identification of a country's main competitors on a particular import market in terms of goods supplied.

As regards to the first advice by estimating the existing inequalities between the results obtained making use of EIS_{ij} and EIS_{ji} measures as regards to the available EU25 trading data. Note that these differences represent asymmetric trading flows possibilities between two trading partners, which may be a feasible explanation for the existing bilateral trade unbalances between some EU25 partners.

However, the respective findings show an extremely low correlation between EIS_{ij} and EIS_{ji}, which is proximate to 0.1404 when measured in terms of the R^2. Hence, the results do not allow for any feasible conclusion.

Sectoral Divisions

In order to apply some sectoral taxonomies, analogous to what was done in Section I.1.4, we will now turn our attention to the identification of the specific effects as regards to the EIS-measure according to different sectors. We will endeavour to split the total EIS-figures previously obtained, aiming at the comparison of this CCT-measure according to different groups of homogeneous products.

We will hereby follow several criteria of sectoral divisions according to the work carried out by PENEDER (2001), which was already referred in Chapter I.1. These three dissections taken into consideration allow us to achieve several remarkable conclusions, which can be inferred from Table I-8.

It can be observed that the big *EU11* countries seem to be, once again, the more successful economic spaces in exporting all types of manufactures. Indeed, Belgium, France, Germany, Italy, the Netherlands, United Kingdom and also Spain jointly fulfil 94.5% of EIS_{ij} top scores (considering as top scores those in the first seven positions). Definitely, Spain seems to be in a great position to export to the EU25 market, a situation that is not present in the rest of its *CC* partners. As a matter of fact, Greece, Portugal and Ireland represent 18.7% of EIS_{ij} lowest scores (considering as lowest scores the lowest seven positions), particularly in *labour-intensive* and *low-skill industries*.

On the other hand, the picture is not as favourable when taking into consideration the *CEEC*, since Bulgaria, Romania and the Baltic countries jointly fulfil 59.3% of EIS_{ij} lowest scores. In addition, whereas Slovenia, Slovakia, Poland and Hungary present a more comfortable situation in the middle of the table, there is a clear outsider to be highlighted. Indeed, the Czech Republic

appears twice on the top scores, related both to *marketing-driven industries* and to *medium-skill/blue-collar industries*.

Table I-8 – EIS_{ij} mean values for exporting countries, following PENEDER (2001)'s factor-input and labour-skill criteria and also demand-dynamism classifications (6-digit CN)

	Factor-Input Criteria					Labour-Skill Criteria				Demand-Dynamism Crit.			
Exp. Country	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Austria	0,5357	**0,4561**	0,3882	0,3602	0,4428	0,4362	0,4478	0,4524	**0,4822**	0,4059	0,4332	0,5171	0,4064
Belgium	**0,5408**	0,4394	**0,4895**	**0,4125**	**0,5255**	**0,4807**	**0,5422**	**0,4954**	**0,5046**	**0,4602**	**0,5123**	**0,5393**	**0,482**
Bulgaria	0,3487	0,3734	0,2796	0,2914	0,3097	0,2969	0,2879	0,2648	0,3352	0,1945	0,2627	0,2877	0,282
Czech Republic	0,5083	0,4487	0,403	**0,3756**	0,4406	0,4252	**0,5275**	0,421	0,4254	0,4038	0,484	0,4854	0,3902
Denmark	0,4863	0,4416	0,3868	0,3424	0,4409	0,3789	0,3854	0,4544	0,4635	**0,44**	0,3775	0,4356	0,418
Estonia	0,3871	0,3492	0,1983	0,2699	0,1966	0,2866	0,216	0,239	0,3979	0,2197	0,234	0,2947	0,2226
Finland	0,4219	0,2732	0,3032	0,3477	0,326	0,3283	0,336	0,3514	0,3768	0,2484	0,3743	0,3756	0,298
France	**0,6289**	**0,504**	**0,5191**	**0,3912**	**0,5454**	**0,4924**	**0,6016**	**0,5837**	0,4784	**0,445**	**0,5841**	**0,5376**	**0,5395**
Germany	**0,6373**	**0,5453**	**0,5112**	**0,4502**	**0,5891**	**0,5525**	**0,5902**	**0,5914**	**0,5876**	**0,5398**	**0,562**	**0,609**	**0,5551**
Greece	0,3976	0,252	0,2995	0,28	0,3797	0,2896	0,3344	0,3321	0,4155	0,284	0,2431	0,3204	0,3152
Hungary	0,4467	0,4216	0,35	0,3093	0,3837	0,3964	0,3885	0,3552	0,3882	0,3315	0,3987	0,4276	0,3479
Ireland	0,3885	0,3425	0,0855	0,2985	0,3518	0,2615	0,4256	0,2535	0,3581	0,33	0,2236	0,2673	0,2477
Italy	**0,6007**	**0,4525**	**0,5047**	0,3702	**0,5629**	**0,4659**	0,5255	**0,5445**	**0,5174**	**0,4269**	**0,5013**	**0,5496**	**0,4895**
Latvia	0,308	0,2558	0,1634	0,2759	0,3294	0,2539	0,1375	0,2859	0,3281	0,2199	0,1566	0,2264	0,2512
Lithuania	0,36	0,3562	0,2207	0,2864	0,3721	0,2954	0,3232	0,2251	0,438	0,2203	0,2811	0,3215	0,2571
Luxembourg	0,2337	0,2491	0,1118	0,2647	0,2981	0,1842	0,3704	0,2261	0,2544	0,2379	0,2184	0,2214	0,2166
Netherlands	**0,5954**	**0,5259**	**0,4736**	**0,3984**	**0,4858**	**0,4601**	**0,5469**	**0,5166**	**0,4874**	**0,458**	**0,4856**	**0,5288**	**0,4864**
Poland	0,5259	0,4224	0,3937	0,3732	0,3232	0,4327	0,4082	0,4022	0,4373	0,2873	0,4234	0,45	0,3604
Portugal	0,3881	0,3448	0,366	0,2992	0,3693	0,3363	0,4545	0,3379	0,3917	0,3081	0,362	0,3694	0,3327
Romania	0,3353	0,377	0,3377	0,2134	0,3253	0,2701	0,2782	0,3095	0,3106	0,2077	0,2544	0,288	0,2735
Slovakia	0,4138	0,4071	0,3772	0,3491	0,3075	0,3419	0,4616	0,3415	0,3732	0,2928	0,3813	0,3903	0,3406
Slovenia	0,4224	0,3893	0,3007	0,3458	0,3133	0,3613	0,3781	0,3102	0,3814	0,2651	0,3402	0,4146	0,3247
Spain	**0,5917**	**0,4861**	**0,5067**	**0,4018**	**0,4763**	**0,4639**	**0,5687**	**0,5442**	**0,5452**	0,4156	**0,5048**	**0,5394**	**0,5014**
Sweden	0,5402	0,3877	0,4275	0,3621	0,4395	0,4067	0,4702	0,4647	0,4567	0,3279	0,4369	0,4971	0,4333
United Kingdom	**0,5982**	**0,4853**	**0,485**	**0,3854**	**0,5772**	**0,4938**	**0,5581**	**0,5518**	**0,5608**	**0,5007**	**0,5385**	**0,5381**	**0,5247**

Source: Authors' calculations based on the European Commission's Comext Database.

Table Codes: *Factor-input criterion*: 1 – mainstream, 2 – labour-intensive industries, 3 – capital-intensive industries, 4 – marketing-driven industries, 5 – technology-driven industries; *Labour-skill criterion*: 1 – low-skill industries, 2 – medium-skill/blue-collar industries, 3 – medium-skill/white-collar industries, 4 – high-skill industries; *Demand-dynamism criterion*: 1 – negative-growth industries, 2 – slow- or nil-growth sectors, 3 – medium-growth sectors, 4 – dynamic-growth sectors.

Note: The seven highest EIS-values achieved following each criterion are highlighted in **bold**. In addition, the opposite seven lowest EIS-values appear underlined.

Finally, it must be referred that several authors also sectorally split total EIS-or COS-figures aiming at obtaining a distinction between *sensitive and non-sensitive sectors*, i.e., whether the products are within the scope of at least a Free Trade Area Agreement, usually agriculture, steel, chemicals and textiles[55]. Other sectoral divisions are also taken into account by different authors, namely the

distinction between *manufacture and agriculture sectors*[56]. An alternative distinction is made between *more and less developed countries*, as a form of testing the existence of inefficient production, higher prices, lower quality product and/or trade barriers in the latter group[57] or the distinction between *conventional and dynamic or high-tech sectors*[58].

I.2.4 Comparative Statics as regards to Empirical Results obtained for 1999 and 2002

The Commodity Composition of Trade may change over time, and it is in fact meant to change. However, as such changes cannot be immediately achieved, it is of some interest to see to what extent CEEC exports match old EU members imports during a particular period, since the matching evolution is likely to provide an anticipated photograph of the intensity of trade between countries in subsequent years. The replacement tendencies between flows can be observed in Table I-9.

At first sight, a clear export pattern trend for the whole set of CEEC cannot be observed. In fact, the only straightforward conclusion that can be taken is that all of these countries have already improved their specialisation pattern positions in the EU market throughout the considered period. However, the same conclusion cannot be inferred for the CC. Ireland seems to have worsened its exporting specialisation pattern and, in addition, Greece seems to have walked in the same direction as regards to its importing analogous pattern.

[55] See ABDALLA (1997), BEERS & BIESSEN (1996) and LAMOTTE (2002), which in turn are based on AGHION *et al.* (1992).
[56] See LINNEMANN & BEERS (1988) or KÖSEKAHYAOĞLU (1994), the latter in the case of Turkey.
[57] See BEERS & BIESSEN (1996).

Table I-9 – Dynamic analysis of the EIS evolution, by comparing 1999 and 2002 average EIS figures, either for importing and exporting flows

Exporting Countries	Diff.	Importing Countries	Diff.
Romania	0.0297	Latvia	0.0259
Hungary	0.0295	Hungary	0.0228
Lithuania	0.0281	Slovakia	0.0198
Greece	0.0275	Estonia	0.0197
Sweden	0.0253	Bulgaria	0.0180
Austria	0.0218	Romania	0.0171
Portugal	0.0203	Finland	0.0169
Spain	0.0196	Spain	0.0167
Poland	0.0191	United Kingdom	0.0158
Denmark	0.0177	Portugal	0.0155
Bulgaria	0.0169	Ireland	0.0150
Latvia	0.0157	Sweden	0.0141
Luxembourg	0.0139	Poland	0.0134
Netherlands	0.0131	France	0.0121
Estonia	0.0073	Italy	0.0103
Finland	0.0027	Denmark	0.0097
Italy	0.0025	Lithuania	0.0087
Slovakia	0.0025	Austria	0.0071
Germany	0.0021	Germany	0.0069
Czech Republic	0.0017	Czech Republic	0.0065
Slovenia	0.0010	Slovenia	0.0065
Belgium	0.0008	Netherlands	0.0021
France	-0.0019	Luxembourg	0.0019
United Kingdom	-0.0063	Greece	-0.0017
Ireland	-0.0186	Belgium	-0.0086

Source: Authors' calculations based on the European Commission's Comext Database.

Taking a deeper view, the economies with a more modern trade structure pattern seem to have performed a more sluggish evolution, whereas less mature patterns seem to have walked in a more dynamic way. Indeed, a clear analogy could be made between these empirical findings and the principle of convergence, although this is not straightforward.

Hence, as regards to exporting flows, the great performance of Romania, Hungary, Lithuania and Greece, is clear. These countries increased their average EIS-exporting figures in at least more than 2.75 hundredths by continually shifting productive resources as a response to received price signals from EU25 Internal Market-to-be.

If we take the Romanian case as our main example, the static figures showed Romania as an attractive economy for foreign trade within a virtual EU25 Internal Market. However, the data did not take notice of the fast progress

[58] See MARTÍN *et al.* (2002).

that the Romanian foreign trade structure has been developing aiming at include itself within the EU25 Internal Market, projected for 2007, in a successful way.

Indeed, the Romanian economy experienced a deep twist in its specialisation pattern towards matching the EU Internal Market needs, increasing the weight of "Electrical Machinery and Equipment" (Code 85), from 4.84% to a great 10.30% of total Romanian exports, and "Mineral Oils and Fuels" (Code 27), from 4.88% to a remarkable 7.91%. It must be certainly emphasized that both these classes are between the most demanded by the EU Internal Market.

A remarkable point amongst the CEEC that must be mentioned is the Latvian step forward, which has diminished its colossal relative weight in "Wood and Articles made of Wood" (Code 44) from 37.26% to 33.57% of total exports and has been mainly substituted by "Aluminium and Articles made of Aluminium" (Code 76), "Preparations of Meat or Fish" (Code 16) and "Tobacco" (Code 24). The Lithuanian and Poland improvements must also be mentioned. Both countries focused on reducing the weight of "Clothing" (Codes 61 to 64) on total exports and increasing the influence of "Machinery and Mechanical Appliances" (Code 84), "Electrical Machinery and Equipment" (Code 85) and, mainly, "Vehicles, other than Railway or Tramway, and Ships" (Codes 87 and 89).

Turning now to the CC's performance, Greece presented the best performance by relatively reducing its "Tobacco" (Code 24), "Mineral Fuels and Oils" (Code 27) and, mostly, "Animal or Vegetable Fats" (Code 15) exporting flows (from 4.65% to 2% of total), progressively substituted by "Electrical Machinery and Equipment" (Code 85), "Iron and Steel" (Code 72), "Plastic and Plastic Products" (Code 39) and, predominantly, "Machinery and Mechanical Appliances" (Code 84) (from 4.26% to 6% of total).

Portugal also saw its relative weight on "Footwear and Clothing" (Codes 61 to 64) decreasing from 20.21% to 16.2% in the 1999-2002 period. As a consequence, the Portuguese exports in "Vehicles, other than Railway or

Tramway" (Code 87) (16.6% of total exports in 2002) and "Machinery and Mechanical Appliances" Code 84) (6.84%) increased in a similar proportion.

To sum up, the export patterns of all the CEEC and CC referred above have become more similar to the analogous EU11 exporting structure, as a reflection of the growth and industrialisation of these CEEC and CC economies during the considered period, following a slight catching-up effect.

However, not all the countries presented this great performance. Six countries worsened its competitive position within the virtual EU25 Internal Market in some trading flows, from which France, United Kingdom and, mostly, Ireland must be highlighted. Explanations for this relatively poor performance of such widely open, competitive and exporting-prone economies[59] may be related to their arrival to a mature stage of competitiveness.

I.2.5 Similarities and Bilateral Trade Relations involving both the CEEC and the CC

Regarding specific trading flows between the CEEC and the EU15 members, we focus on the Cohesion Countries as CEEC's trading partners, i.e. Portugal, Greece, Spain and Ireland.

First and foremost, it can be clearly observed from Table I-7 that CC exports have a relatively low score over all the CEEC importers (the lowest of all considered groups, with the only exception being Greece). In fact, this average EIS-value barely achieves 0.325 for the CC as a whole, ranging from the 0.469 obtained for Spain to the 0.216 obtained for Ireland. Moreover, the CC (once again with the exception of Greece, which turns to be the only CC with the CEEC as its most suitable client) present a better foreign trade structure for exporting to the EU11 than to the CEEC.

The commodities imported by the CEEC should be mainly supplied by countries with a relatively high EIS average value (higher than 0.43 - Table I-10). These turn out to be, in the following order, Germany, France, Italy, United Kingdom, Spain, Belgium, the Netherlands, Austria and the Czech Republic.

Indeed, these countries' exports are concentrated in those categories that give more possibilities to product differentiation and intra-industry trade, that is to say the trilogy "Machinery and Mechanical Appliances", "Electrical Machinery and Equipment" and "Vehicles other than Railway or Tramway" (Codes 84, 85 and 87), as it can be concluded from Table I-4 and Table III-8.

On what concerns class-products, the CC exports seem to be concentrated in commodities that apparently represent a relative small part of the import package of the CEEC (with the already mentioned exception of Spain). Indeed, the CC exports are not as concentrated in the above trilogy as the EU11 exporting flows are. Additionally, CC exports are also intense in "Organic Chemicals" (Code 29) in the Irish case, "Clothing" (Codes 61 to 63) in both the Portuguese and the Greek cases or "Aluminium and Products Made of" (Code 76) in the Greek case.

As a consequence, the CEEC should have a clear preference for the EU11 instead of the CC as their source of suppliers and the only exception to this seems to be Spain[60], confirming the empirical data observed within the previous section of this dissertation[61].

Table I-10 – Average EIS_{ij} for the CEEC as importing countries (1999-2002 Average and 6-digit Comext's CN)

CEEC importing countries	EISij	CEEC importing countries	EISij
Germany	0,5414	Slovenia	0,3475
France	0,4932	Slovakia	0,3445
Italy	0,4893	Portugal	0,3208
United Kingdom	0,4796	Finland	0,3153
Spain	0,4693	Greece	0,2939
Belgium	0,4647	Lithuania	0,2639
Netherlands	0,4468	Bulgaria	0,2587
Austria	0,4464	Romania	0,2529
Czech Republic	0,4368	Estonia	0,2353
Sweden	0,4239	Ireland	0,2159
Denmark	0,3989	Luxembourg	0,2118
Poland	0,3827	Latvia	0,2062
Hungary	0,3478		

Source: Authors' calculations based on the European Commission's Comext Database.

[59] Table III-7 shows in which grade it happens.
[60] Especially when the Slovenian and Bulgarian markets are targeted, where the Spanish exporting pattern occupies the second and the third best positions, respectively.
[61] Once again, it must be reminded that the Irish is a particular case, due to the high degree of concentration in its exports.

From a dynamic point of view, we can observe in Table I-11 that the previous conclusions may somehow be blurred and not maintained in the same parameters for the future. Indeed, Portugal, Spain or Greece experienced a relatively high improvement in their exporting structure pattern to the CEEC markets (sixth, seventh and ninth best improvements). Therefore, these three CC seem to be gaining aptitude in satisfying the CEEC markets and, as a result, are expected to increase their shares in those markets. The only exception is once again the Irish case, which must be considered as a special case, in spite of its unpleasant result, for the reasons above referred (see Section I.1.3). Consequently, inferring conclusions must be avoided.

Surprisingly, three CEEC appear amongst the four best-succeeded EU25 countries to fulfil the CEEC necessities, namely Poland, Romania and, mostly, Hungary.

Table I-11 – Dynamic analysis of the EIS evolution, by comparing 1999 and 2002 average EIS figures for CEEC as importing countries (6-digit Comext's CN)

CEEC importing countries	EISij	CEEC importing countries	EISij
Hungary	0,0438	Czech Republic	0,0151
Romania	0,0339	Bulgaria	0,0127
Austria	0,0308	Slovenia	0,0108
Poland	0,0283	Luxembourg	0,0106
Sweden	0,0264	Slovakia	0,0100
Portugal	0,0255	France	0,0082
Spain	0,0252	Italy	0,0077
Netherlands	0,0224	Belgium	0,0069
Greece	0,0221	Estonia	0,0067
Germany	0,0179	Finland	0,0056
Lithuania	0,0177	United Kingdom	-0,0007
Latvia	0,0161	Ireland	-0,0189
Denmark	0,0151		

Source: Authors' calculations based on the European Commission's Comext Database.

Secondly and turning to the analysis of the *CC imports* (see Table I-12), the conclusions remain unchanged for a certain number of countries, namely for Bulgaria, Romania and the so-called three Baltic Countries, whose exporting structures appear to be relatively differing from the CC needs (their average EIS-value barely achieves 0.255).

Nonetheless, the rest of the CEEC present a much higher average EIS-figure, which ranges from 0.415 in the Czech case to 0.337 in the Slovenian one. These values clearly express a relatively high ability to match the CC requests (even better than countries such as Greece, Finland, Portugal and Denmark).

Regarding the class-products, the CEEC exports seem to be concentrated in commodities that apparently are a relative small part of the import package of the CC in the sample. Indeed, the CEEC exports are not as concentrated in the trilogy "Machinery and Mechanical Appliances", "Electrical Machinery and Equipment" and "Vehicles other than Railway or Tramway" (Codes 84, 85 and 87) as the EU11 exporting flows are. As a matter of fact, CEEC exports are also intense in "Wood and Articles made of Wood" (Code 44), as it happens in the case of the Estonian and Latvian exports, "Clothing and Footwear" (Codes 61 to 64), as it is the case of the Latvian, Lithuanian, Bulgarian and Romanian exporting flows, or "Mineral Fuels and Oils" (Code 27), in case of the Lithuanian and Bulgarian exports.

As a consequence, the CC should have a clear preference for the EU11 instead of the CEEC as their source of suppliers. The only exception to this seems to be the cases of Slovenia, Slovakia, Hungary, Poland and, mostly, the Czech Republic, confirming the empirical data previously observed.

Table I-12 – Average EIS_{ij} for the CC as importing countries (1999-2002 Average and 6-digit Comext's CN)

CC importing countries	EISij	CC importing countries	EISij
Germany	0,5470	Portugal	0,3397
France	0,5432	Slovakia	0,3388
United Kingdom	0,5255	Slovenia	0,3365
Spain	0,5141	Finland	0,3044
Belgium	0,5000	Greece	0,2867
Italy	0,4905	Lithuania	0,2550
Netherlands	0,4903	Bulgaria	0,2541
Sweden	0,4167	Romania	0,2486
Austria	0,4160	Ireland	0,2332
Czech Republic	0,4152	Estonia	0,2250
Denmark	0,4030	Luxembourg	0,2142
Poland	0,3798	Latvia	0,2060
Hungary	0,3661		

Source: Authors' calculations based on the European Commission's Comext Database.

From a dynamic point of view, we can observe, in Table I-13, that the previous conclusions are also blurred, in certain measure, for the considered period. Indeed, the CEEC experienced a heterogeneous improvement in their exporting structure pattern to the CC markets when considered as a whole.

Taking a deeper view, it is quite interesting to note that the worst situated CEEC in 1999 carried out the most astonishing evolution, namely Latvia, Bulgaria and, mostly, Romania and Lithuania. Therefore, this group of CEEC seem to be gaining success in satisfying the CC markets and, as a result, are expected to increase their shares in those markets.

On the other hand, it must be noted that those countries previously referred as the most successful in tackling the CC markets (and also the EU11 markets), such as Hungary, Slovakia, the Czech Republic and Slovenia experienced either stabilization or retreat. These results go in the direction of the principle of convergence.

Surprisingly, two CC also appear amongst the four best-succeeded EU25 countries to fulfil the CC necessities, namely Portugal and, mostly, Greece. It must be reminded that these two countries were a step behind Spain in their exporting structure, but that conclusion seems to be loosing actuality due to the existence of a slight catching-up effect involving the former countries.

Table I-13 – Dynamic analysis of the EIS evolution, by comparing 1999 and 2002 average EIS figures for CEEC as importing countries (6-digit Comext's CN)

CC importing countries	ΔSij	CC importing countries	ΔSij
Lithuania	0,0457	Luxembourg	0,0110
Greece	0,0423	Estonia	0,0073
Romania	0,0371	Belgium	0,0071
Portugal	0,0248	Finland	0,0042
Poland	0,0245	Slovakia	0,0036
Bulgaria	0,0230	Italy	0,0012
Latvia	0,0189	France	0,0006
Denmark	0,0178	Czech Republic	-0,0046
Austria	0,0160	United Kingdom	-0,0070
Spain	0,0149	Slovenia	-0,0076
Sweden	0,0140	Germany	-0,0103
Hungary	0,0139	Ireland	-0,0223
Netherlands	0,0121		

Source: Authors' calculations based on the European Commission's Comext Database.

As a concluding remark, it seems clear that the countries specialising in the trilogy "Machinery and Mechanical Appliances", "Electrical Machinery and Equipment" and "Vehicles other than Railway or Tramway" present an obvious comparative advantage in terms of the Foreign or the Domestic Competitive Challenge. Within this framework, the degree of success achieved by the CEEC in shifting old non-market international trade patterns must be split in two blocks of countries. Firstly, one composed by the Czech Republic, Poland, Hungary, Slovenia and Slovakia, which seem to be on the right track, and, a second group, far apart, formed by the Baltic Countries, Romania and Bulgaria, one step behind.

PART II

The estimation of the bilateral trade potential in terms of manufactures involving each one of the EU25 members in the threshold of the CEEC's accession, based on the gravity model, one of the most relevant instruments used in international economics, will constitute the *second stage of this dissertation*.

Initially, we endeavoured to estimate a gravity model that not only permits the identification of the determinant factors of foreign trade, something usual in this kind of literature, but also to take into consideration the bilateral trade potential in terms of manufactures involving each one of the EU25 members.

Having in consideration the above mentioned aim, a Panel Data was built for the 1999-2002 period using the Foreign and Internal European Trade Data withdrawn from the *Eurostat's Data Base* known as *Comext*. Note also that the selection of the above chronological range was strongly conditioned by the fact that 1999 was the first year in which the *Eurostat* compiled methodologically harmonised data for the CEEC.

Within this context, this dissertation is, to the best of our knowledge, the first that aims at calculating a bilateral trade potential focused on the totality of EU25 countries paying special attention to the bilateral flows involving both the CEEC and the CC. Moreover, this dissertation is also, also to the best of our knowledge, the first that methodologically combines a trade potential estimation, based on a gravity model, with the inclusion of a variable related to the Commodity Composition of Trade (CCT) in terms of manufactures, i.e., to the measure of the complementarity between the symmetric trade vectors of pairs of countries.

We will perceive that most studies employing this methodology estimate the potential foreign trade making use of factors either from the supply or the demand side, following LINNEMANN's (1966) methodology. However, only a few studies take into account a measure of complementarity in tems of

commodity structure of trade flows, already referred in Chapter I.2, as one of the factors determining the intensity of trade[62] between a pair of trade partners.

Hence, this second part of the dissertation will seek, on one hand, to evaluate the main determinant factors of the trade flows between the three blocks of countries considered throughout our study (CC, CEEC and EU11), as well as to analyse the corresponding trade potential. On the other hand, it endeavours to evaluate whether the CCT constitutes an explanatory variable of the trade level.

First and foremost, we will analyse the abundant literature related to the gravity model that has been published so far, paying special attention to both the theoretical and empirical evolutions suffered in terms of either estimation, specification and of variables-inclusion related issues. All these recent contributions to the gravity model taxonomy will have the baseline gravity model as their starting point.

Secondly, related to the final aim of this dissertation, we will empirically estimate a gravity model that will take into account the several empirical applications found in literature that have recently contributed to the improvement of the econometric specification of the gravity equation. Furthermore, the refinement of some of the explanatory variables considered and the addition of some others will be also tackled, bringing the original equation close to more realistic situations.

In addition, we will analyse if the complementary coincidence in terms of exporting supply and importing demand vectors between the three blocks of countries considered in this dissertation explains their actual bilateral foreign trade structure, i.e. if the CCT variable is statistically significant by making use of the proper gravity model. The gravity equation constitutes an appropriate tool for this task as it allows the quantification of "*the relative importance of variables as determinants of trade flows size*", following LINNEMANN (1966, pp. 4).

All these recent contributions will allow us to statistically calculate the trade potential that each EU25 country would be able to apprehend as regards to

[62] Note that what we are referring to in this study is the expected, rather than actual, intensity of trade.

their EU25 trading partners, having both cross-section and panel data as the considered source of statistics. Within this standpoint, we will be in the position of comparing this trade potential to the current trading flows observed, which will also allow to observe the evolution experienced by the bilateral trading flows involving EU25 countries. This procedure will allow us to predict the evolution of the bilateral trading flows for a few years to come, paying special attention to the CEEC-CC flows.

Finally, in the *third* chapter of this second part, we will highlight special limitations that were found throughout the empirical work while it was being carried out and mention future paths of investigation.

CHAPTER I – LITERATURE REVIEW

Most studies concerning the measure of the exchange potentials make use of gravity models. Indeed, the empirical results of the gravity approach applied to the international trade pattern allow us to conclude that, despite its simplicity, the gravity model explains the actual pattern of trade flows remarkably well. One of the main *advantages* of the gravity model is that it needs little data comparatively to the other analytic tools, while internationally comparable data for the construction of a gravity model is usually available. The above mentioned advantages are of particular interest to the modelling of trade flows and to the development of trade scenarios of economies in transition and for the exploration of the integration processes of transitional and industrialised economies.

TINBERGEN (1962), PÖYHÖNEN (1963) and PULLIAINEN (1963) are three independant pioneers of the empirical foreign trade analysis using a gravity model[63]. The latter was firstly defined as an equation in which the size of the trade flows between two countries is explained by supply conditions at the origin and by demand conditions at the destination[64], as well as by stimulating or restraining forces related to the specific flows between the two countries[65].

[63] In fact, although their works appeared with little time difference, they were totally unrelated.
[64] Known as *pull factors* following terminology by PAAS (2003).
[65] Known as *push factors* following terminology by PAAS (2003).

However, this first approach only included as its employed features the national incomes of the involved countries and the respective cost of transportation among them. Consequently, LINNEMANN's gravity equation (1966) included population as an additional measure of country's size.

II.1.1 Theoretical Heritage of the Gravity Equation

Despite its widespread empirical use, described as the "*workhorse of empirical studies of regional integration to the virtual exclusion of other approaches*"[66] or even as "*probably the most successful empirical trade device of the last twenty-five years*"[67], the gravity equation has been a model in search of a theory. Several different theories have been developed in support of the gravity model and the differences in these theories help to explain the many different forms the gravity equation takes and differences in the results obtained.

Therefore, the theoretical foundations of the gravity equation were subsequently developed after the first empirical steps had been taken. Indeed, the first theoretical contribution, by ANDERSON (1979), rested on product differentiation and on complete specialisation, assuming homothetic and uniform (COBB-DOUGLAS) preferences across importing countries and also Constant Elasticity Substitution (CES). Afterwards, BERGSTRAND (1985) was the first to include price to the earlier hypothesis, which had been absent from LINNEMANN's work. Four years later, the same author developed the generalised gravity equation based on the monopolistic competition model to which he added relative factor-endowment differences and non-homothetic tastes based on different per capita incomes following the spirit of LINDER (see BERGSTRAND (1989)).

Moreover, the best-known theoretical rationale for the idea that bilateral trade depends on GDPs (representing sizes) is the result of the work by HELPMAN (1987) and HELPMAN & KRUGMAN (1985, section 1.5). In effect, the latter used a differentiated product framework with increasing returns

[66] EICHENGREEN & IRWIN (1998, pp. 23).
[67] ANDERSON (1979, pp. 106).

to scale to justify the gravity model (1985, ch. 8). However, the above mentioned author did not conclude on theoretical foundations of distance and, therefore, they cannot be properly considered as foundations of the full gravity model.

Additionally, HAVEMAN & HUMMELS (2000) and FEENSTRA *et al.* (2001) derived the gravity equation without relying on complete specialisation, while DEARDORFF (1998) and EVENETT & KELLER (2002) evaluated the usefulness of gravity models by testing alternative theoretical models of trade. Hence, the above mentioned authors proved that the gravity equation characterises many models and can be justified by standard international trade theories. In more detail, they derived the gravity equation from two extreme cases of the HESCHKER-OHLIN model, one considering only homogeneous goods and the other considering all countries as producing different goods. The differences in these theories help to explain the various specifications and some of the diversity present in the results of the empirical applications.

In this respect, it would be useful to point out that the recent flurry of theoretical work led FRANKEL (1997, pp. 53) to state that the gravity equation has "*gone from an embarrassing poverty of theoretical foundations to an embarrassment of riches. For our purposes, the main point is that it seems possible to derive the gravity model from a variety of leading theories*"[68].

Finally and as a concluding remark, it can be also stated that the theoretical considerations of the gravity model are based either on microeconomic foundations, trade theories or on the new economic geography[69]. These theoretical foundations are also acceptable when analysing possible consequences of regional integration in the context of EU eastward enlargement.

[68] See also CHENG & WALL (2002, pp. 2), BALDWIN (1994, pp. 82) and WANG & WINTERS (1991).

[69] See PAAS (2002, pp. 8-12) and OGULEDO & MCPHEE (1994, pp. 110-112) for a detailed description of the three possible pillars. See also THARAKAN (2002, pp. 3) or FRANKEL (1997, pp. 49) for specifically establishing a useful partnership between the new economic geography and the gravity models, being clearly the latter an attractive analytical device for empirical analysis of some issues linking trade and space.

II.1.2 Empirical Cumulated Experience

Although the already referred LINNEMANN's model has been reproached for its lack of a clear theoretical foundation, it has constituted a base for most of the empirical studies on trade in the 1990s, due to its relatively high empirical goodness of fit.

In particular, it has been used to analyse the trade exchanges between the CEEC and the several sets of European Union configurations[70]. As already referred, it is also interesting to note that only a few studies have taken into account the composition of trade by product, without, however, evaluating the trade potential[71]. Moreover, only BEERS & LINNEMANN (1992) and ARNON, SPIVAK & WEINBLATT (1996) have so far dared to conciliate the measurement of the composition of trade by product with the evaluation of the trade potential.

The widely used methodology aims at the estimation of the coefficients of the so-called gravity variables in order to evaluate their importance in the trade exchange explanation. The following methodological step intends to apply these coefficients to the data of each and every country. Therefore, the originality of each study relies on the choice of the variables that determine the gravity and/or on the adoption of more of less restrictive hypothesis, which led several authors to test different versions of LINNEMANN's equation.

The updated traditional specification in this kind of regressions by authors such as FRANKEL & WEI (1992) has lately received several critics. However,

[70] See, for instance, COLLINS & RODRIK (1991), HAVRYLYSHYN & PRITCHETT (1991), WANG & WINTERS (1991), HAMILTON & WINTERS (1992), ROSATI (1992), BALDWIN (1993, 1994, 1997) and WINTERS & WANG (1994). All these studies made use of the gravity model to predict the potential for trade expansion with the EU12 and were based on the yearly trade data from before the change of regime in 1989 (wrongly including the latter). Subsequently, all of them predicted that East-West trade should expand in the long run to a multiple of the level present at the end of the 1980s, after having rapidly replaced the centralised and highly administrative trading regimes with a market-based system. Furthermore, GROS & GONCIARZ (1996) concluded that trade between the EU and the CEEC did not deviate from what normal (non-preferential) trade relations would have already been predicted in 1992 (taking as point of reference just the Czech Republic, Slovakia, Poland and Hungary. More recent authors have also focused their attention on this subject, such as IVERSEN (1998), CORNETT & IVERSEN (1998), FIDRMUC (1999), BUCH & PIAZOLO (2000), NILSSON (2000), PAAS (2000, 2002, 2003), AFRICANO & TELES (2001), LAASER & SCHRADER (2002) and AFRICANO (2004).

thanks to the subsequent various modelling refinements and their application to debates on the theoretical foundation of the gravity model, this model has established itself as a serious empirical tool for exploring regional trade patterns.

Particularly, a huge number of empirical applications found in literature has recently contributed to the improvement of the econometric specification of the gravity equation[72], to the refinement of the explanatory variables considered in the analysis[73] and to the addition of new variables, bringing the original equation close to more realistic situations[74].

Note that all these contributions have been methodologically translated in important improvements in the gravity model, since they succeeded in the eliminatation of strong distortions of the traditional specification of this type of regressions.

Thus, one of the purposes of this dissertation is to match the results obtained by making use of the updated traditional gravity model methodology by FRANKEL & WEI (1992) with the methodological alterations proposed by MÁTYÁS (1997, 1998), CHENG & WALL (2002) and SILVA & TENREYRO (2003, 2004), on what concerns the inclusion of a heterogeneous domestic space within countries. This inclusion is translated in the introduction of appropriate regional dummies in the estimation of international trade flows. Equally important is the addition in the updated traditional gravity model of the methodology by POLAK (1996), related to the measurement of distance, as weel as the proposal of the introduction of a variable of relative distance as a complement to the use of absolute distances.

More recently, JAKAB, KOVACS & OSZLAY (2001) went further in the study of trade potentials by defining a new measure, namely the average convergence speed, defined as the rate of the average potential trade growth

[71] See, for instance, LINNEMANN (1966), AITKEN (1973), LEAMER (1974), HEWETT (1976), LINNEMANN & BEERS (1988) BEERS & BIESSEN (1996) LIMAM & ABDALLA (1998) and LAMOTTE (2002).
[72] See, for instance, MÁTYÁS (1997, 1998), , BREUSS & EGGER (1999), EGGER (2000), CHENG & WALL (2002) or SILVA & TENREYRO (2003, 2004).
[73] See, for instance, POLAK (1996), WEI (1996) or LIMÃO & VENABLES (1999).
[74] See, for instance, BERGSTRAND (1985), HELPMAN (1987), SOLOAGA & WINTERS (1999) and BOUGHEAS *et al.* (1999).

divided by the rate of the average real trade growth. This measure is used to evaluate the speed of real and potential trade convergence.

Therefore, it would be possible, in Chapter II.2, to empirically contribute to this challenging methodological matter that stimulates the academic community, concerned about the applications of gravity models to economics, testing the main model's accuracy to represent international trade reality.

II.1.3 The Evolution of the Baseline Gravity Model's Specification for Cross-Section Data

The gravity model for trade is analogous to Isaac Newton's "Law of Universal Gravitation" in mechanics, in which the gravitational pull between two physical bodies (in newtons) is proportional to the product of each body's mass (in kilograms) divided by the square of the distance between their respective centres of gravity (in metres).

From a methodological point of view, gravity theory can be considered as a relational theory, which describes the degree of spatial interaction between two or more points in a mode analogous to physical phenomena[75].

As early as in the middle of the nineteenth century, CAREY (1858-1859)[76] observed the presence of gravitational forces in social phenomena, stating that these forces were in a direct ratio to mass and inverse to distance[77].

The trade-related analogous model is as follows: the trade flow between two countries is proportional to the product of each country's "economic mass", generally measured by GDP, each to the power of quantities to be determined, and inversely proportional to the distance between the countries' respective "economic centres of gravity", generally their capitals, broadly constructed to include all factors that might create trade resistance and raised to the power of another quantity to be determined.

[75] See NIJKAMP & REGGIANI (1992).
[76] CAREY, H. C. (1858-1859), *Principles of Social Science*, quoted in ISARD (1960) and PAAS (2002).
[77] See SEN & SMITH (1995) for a complete survey about the empirical success achieved by the gravity equation in explaining various types of inter-regional and international flows, such as labour migration, commuting, customers, hospital patients and international trade.

Such a model, which will be referred to, from now on, as the baseline gravity model and which will be progressively expanded, offers room for estimation, as the exponents for the two masses and for distance are not set.

Equation II-1 – Deterministic Baseline Gravity Model

$$M_{ij} = k.Y_i^{\beta}.Y_j^{\gamma}.D_{ij}^{\delta}$$

where M_{ij} is the flow of imports into country i from country j, Y_i and Y_j are country i's and country j's GDPs, and D_{ij} is the geographical distance between the countries' capitals. Lastly, β, γ and δ are the parameters to be estimated.

The analogy between trade and the physical force of gravity, however, clashes with the observation that there is no set of parameters for which the equation will hold exactly. To account for deviations from the deterministic central equation, stochastic versions of the Equation II-1 are used in empirical studies[78]. Typically, the stochastic version of the baseline gravity equation has the following form:

Equation II-2 – Stochastic Baseline Gravity Model

$$M_{ij} = k.Y_i^{\beta}.Y_j^{\gamma}.D_{ij}^{\delta}.\eta_{ij}$$

where η_{ij} is an error term with $E[\eta_{ij}/Y_i,Y_j,D_{ij}] = 1$, assumed to be statistically independant of the regressors.

Moreover, there has been a long tradition in the trade literature of log-linearising Equation II-2, starting from its pioneers, TINBERGEN (1962), PÖYHÖNEN (1963) and PULLIAINEN (1963)[79], and subsequently of estimating the parameters of interest by ordinary least squares (OLS) using the following equation:

[78] See BERGSTRAND (1985) as an example of the application of this nomenclature.
[79] See more recently also PREWO (1978) and, mostly including dummy variables, AITKEN & OBUTELEWITCZ (1976), GERACI & PREWO (1977), ABRAMS (1980), SAPIR & LUNDBERG (1984), THURSBY & THURSBY (1987), MCCALLUM (1995), HELLIWELL (1996), BOISSO & FERRANTINO (1997), WALL (2002) and CHRISTIE (2002).

Equation II-3 – Linear Stochastic Baseline Gravity Model

$$\ln(M_{ij}) = \alpha + \beta.\ln(Y_i) + \gamma.\ln(Y_j) + \delta.\ln(D_{ij}) + \ln(\eta_{ij})$$

It is common in gravity models to treat imports and exports separately, as dependant variables, in different regressions. Most studies find income coefficients and therefore income elasticities to be slightly different on the import and the export side. Indeed, constraining them to be equal produced little change in the results following LINNEMANN (1966).
Note also that coefficients on distance and on the other possible bilateral variables are necessarily equal for imports and exports.

The above baseline model, when estimated, presents relatively good results. However, we know that there are other factors that influence trade levels.

The first of these to be added into the baseline gravity model, as an additional measure of the country's size, was population, firstly included by LINNEMANN (1996), often in the form of income *per capita*. This model is frequently called "augmented gravity model", following CHENG & WALL (2002) terminology.

Equation II-4 – Linear Stochastic Augmented Gravity Model[80]

(i) $$\ln(M_{ij}) = \alpha + \beta.\ln(Y_i) + \gamma.\ln(Y_j) + \varphi.\ln(N_i) + \lambda.\ln(N_j) + \delta.\ln(D_{ij}) + \ln(\eta_{ij})$$

or alternatively, making additional use of *per capita* income variable,

(ii) $$\ln(M_{ij}) = \alpha' + \theta.\ln(Y_i) + \varpi.\ln(Y_j) + \psi.\ln(Y_i / N_i) + \tau.\ln(Y_j / N_j) + \\ + \delta'.\ln(D_{ij}) + \ln(\eta_{ij})$$

In effect, there are two standard methods of measuring the size of countries in the gravity model, namely the GDP or the population. However, the coefficient on population is generally negative when held constant for GDP. This captures the well-known phenomenon of larger countries tending to be relatively less open to trade as a percentage of GDP.

[80] See SANSO, CUARAIN & SANZ (1993) for an exhaustive analysis of the predictive power of the various specifications of the augmented gravity model.

Note that the above alternative specifications are equivalent, allowing for the following transformation of the estimated coefficients: $\varphi = -\psi$; $\lambda = -\tau$; $\beta = \theta + \psi$; $\gamma = \omega + \tau$ (BERGSTRAND (1989, pp. 143)).

Whereas the former (i) equation represents the size of the economy as well as the size of the country[81], the latter (ii) equation represents the level of economic development[82]. For that reason, both measures are often simultaneously used[83], without presenting any mathematical problem (see FRANKEL (1997, pp. 57-58).

HARRIS *et al.* (2000) and BEERS & BERGH (1997, 2000) presented as an additional size variable a measure of land area. It is considered a method of translating the natural resource capacity, since it indicates that a country can be relatively more self-sufficient and less dependant on trade on that way (See FRANKEL & ROMER (1996), tab. 1).

Aiming at new specifications, several studies added the absolute difference between the two countries' per capita incomes as an explanatory variable to the basic gravity equation[84], following the spirit of LINDER (1961) - *INEQ* variable[85]. GRUBER & VERNON ((1970), p. 256) also appended absolute *per capita* income differences to a gravity model specification as a "*crude index of the difference in consumption patterns*".

In this respect, LINDER suggested that "*taste similarities*" between nations are a key determinant of bilateral trade patterns. In his view, "*international trade is really nothing but an extension across national frontiers of a country's own web of economic activity*" (1961, pp. 88) and, therefore, it

[81] See as examples LINNEMANN (1966), AITKEN (1973), LEAMER (1974), SAPIR (1978, 1981), ANDERSON (1979), BRADA & MENDEZ (1983), BIKKER (1987), LINNEMANN & BEERS (1988), BEERS & LINNEMANN (1992), OGULEDO & MACPHEE (1994), POLAK (1996), BEERS & BIESSEN (1996), MÁTYÁS (1998), HARRIS & MÁTYÁS (1998, 2001), MÁTYÁS *et al.* (2000), HARRIS *et al.* (2002), BEERS & BERGH (2000), KALBASI (2001), CHENG & WALL (2002) and LAMOTTE (2002).

[82] See as examples SATTINGER (1978), THOUMI (1989), FRANKEL & WEI (1993a), GROS & GONCIARZ (1996), FRANKEL (1997), LIMAM & ABDALLA (1998), BUCH & PIAZOLO (1998), SMARZYNSKA JAVORCIK (2001), PIANI & KUME (2000), GARCÍA-MENÉNDEZ *et al.* (2000), MARTÍNEZ-ZARZOSO & NOWAK-LEHMAN (2001), PAAS (2002), THARAKAN (2002) and EGGER (2002).

[83] See also BERGSTRAND (1989), SANSO *et al.* (1993), FRANKEL, STEIN & WEI (1995, 1998) and EICHENGREEN & IRWIN (1998).

[84] See for example LEAMER (1974), SATTINGER (1978), ABRAMS (1980), LINNEMANN & BEERS (1988), FRANKEL & WEI (1993a), SANSO *et al.* (1993), LIMAM & ABDALLA (1998) and EGGER (2000, 2002).

[85] See for instance HUFBAUER (1970), LINNEMANN & BEERS (1988) and BEERS & LINNEMANN (1992).

follows that exporters will search for countries with similar demand patterns as most likely potential markets for their products.

As a final conclusion, and according to LINDER, "*the more similar the demand structures of two countries, the more intensive, potentially, is the trade between these two countries*" (1961, pp. 94), which basically lead us to infer that countries will trade, other things being equal, with countries of a similar *per capita* income, since the demand structure is largely determined by the latter[86].

Equation II-5 – Linear Stochastic Augmented Gravity Model by LINDER

$$\ln(M_{ij}) = \alpha + \beta.\ln(Y_i) + \gamma.\ln(Y_j) + \varphi.\ln(N_i) + \lambda.\ln(N_j) + \delta.\ln(D_{ij}) + \\ + \pi.\ln(INEQ_{ij}) + \ln(\eta_{ij})$$

It should be noted that the theories of LINDER and HESCHKER-OHLIN imply different signs for the coefficient of INEQ variable, negative in the former case and positive in the latter. Indeed, as FRANKEL (1997, pp. 59) refers "*seldom do competing theories have such directly contradictory empirical implications*".

Similarly, THURSBY & THURSBY (1987) added absolute per capita income differences to a generalised gravity equation without populations (see BERGSTRAND (1985)). The authors added this variable to "*reflect differences in importer j's tastes*" (p. 490). Finally, MARTÍNEZ-ZARZOSO & NOWAK-LEHMAN (2001, pp. 6) and ARNON *et al.* (1996, pp. 126) included, instead, an equivalent variable representing the squared *per capita* income differential, attempting to put more weight on the extreme values.

Alternatively, several authors such as FRANKEL & WEI (1993a, pp. 13)[87] included more direct measures of factor endowments than that of inequality in *per capita* incomes, namely Capital/Labour ratios, Land/Labour ratios or educational levels such as Human Capital Intensity. However, LEAMER (1974) had already concluded that added factor-endowment variables performed less well in a gravity-type equation that the standard *per capita* income inequality variables.

[86] This implication of the LINDER hypothesis has been illustrated graphically by HUFBAUER (1970).
[87] See also LEAMER (1974), SATTINGER (1978), SAPIR & LUNDBERG (1984), SANSO *et al.* (1993), FRANKEL (1997) and EGGER (2000, 2002).

Furthermore, several other authors such as FRANKEL & WEI (1993, pp. 6) or PIANI & KUME (2000) introduced another specification by establishing the absolute and *per capita* income variables in a product form, namely:

Equation II-6 – Linear stochastic augmented gravity model in its product form

$$\ln(M_{ij}) = \alpha + \beta.\ln(Y_i \,.Y_j) + \gamma.\ln\left[(Y/N)_i.(Y/N)_j\right] + \delta.\ln(D_{ij}) + \ln(\eta_{ij})$$

These two authors underline that this methodology has been empirically well-established in bilateral trade regressions and, in addition, also show the way in which it can be justified by the modern theory of trade under imperfect competition.

Lastly, EICHENGREEN & IRWIN (1998) suggested of another extension that takes into consideration the fact that contemporaneous trade flows are likely to be strongly correlated to previous flows, yielding a dynamic model of flows characterised by a persistence of habits[88]. Indeed, these authors use the term hysteresis to refer to the existence of lags in trade patterns that seem to linger long after the original reasons for the bilateral trade have vanished. A possible explanation for these self-sustaining effects in trade patterns may be among other factors, political ties, historical reasons, the presence of sunk costs, the existence of asymmetrical infrastructures or the effects of accumulated stock of FDI[89].

Within this context, the hysteresis assumes special importance when analysing the EU15 eastward enlargement, since the current State-members have already created a well-integrated market among themselves.

Note that the choice between the static and dynamic models is not an obvious one, as there are no well-defined procedures to do so. This is, however, a quite important question as the parameter estimation provided by these

[88] Other authors followed them, such as FRANKEL (1997, pp. 128), HARRIS & MÁTYÁS (1998, 2001) and SILVA & TENREYRO (2003, 2004). In addition, SOLOAGA & WINTERS (1999) also recognised this problem, but their solution was to estimate yearly gravity models and to calculate the effects of integration as the differences in the predicted trade volumes over time.

[89] There has been a significant amount of both theoretical and empirical literature suggesting reasons for such hysteresis in trade flows (see BALDWIN (1988), DIXIT (1989) and BALDWIN & KRUGMAN (1989) on theoretical reasons and BEAN (1987) and ROBERTS & TYBOUT (1997) on empirical examples).

specifications may be substantially different. Consequently, the choice between models should be based on the purpose of our analysis. In other words, if our main goal is forecasting, then the dynamic model is more adequate. On the other hand, if structural (policy) analysis is the main objective of a given study, the static model is to be used, as the introduction of dynamics (in the form of lagged dependant variables) removes most of the significance of the structural parameters, as showed by HARRIS & MÁTYÁS (1998).

Equation II-7 – Linear stochastic augmented dynamic gravity model (*with hysteresis*)

$$\ln(M_{ij}) = \alpha + \beta.\ln(M_{ijt-1}) + \gamma.\ln(Y_{it}) + \delta.\ln(Y_{jt}) + \varphi.\ln(N_{it}) + \\ + \phi.\ln(D_{ij}) + \pi.\ln(N_{jt}) + \ln(\eta_{ij})$$

Regarding the number of lags, HARRIS & MÁTYÁS (2001, pp. 21) proved that a period of four to five years is required before trade flows return to their equilibrium levels following an exogenous shock.

Apart from these new design methods, a group of specific variables is usually included, namely prices variables, following HARRIS & MÁTYÁS' nomenclature (1998, 2001). In fact, the traditional gravity model represents equilibrium trade flows, with prices adjusting as an endogenous variable. Consequently, prices are generally excluded from the specification, in spite of the models being criticised for that. However, it appears sensible to allow for the possibility that the system might be in some form of (temporary) disequilibrium, by additionally including "prices" in the specification, namely such as Foreign Currency Reserve (FCR) or Real Exchange Rate (RER) variables:

Equation II-8 – Linear stochastic augmented gravity model with price variables

$$\ln(M_{ij}) = \alpha + \beta.\ln(Y_{i}) + \gamma.\ln(Y_{j}) + \varphi.\ln(N_{i}) + \lambda.\ln(N_{j}) + \delta.\ln(D_{ij}) + \\ + \pi.\ln(FCR_{ij}) + \kappa.\ln(RER_{ij}) + \ln(\eta_{ij})$$

These variables seems to be so stochastic for certain authors that AITKEN labelled the equation in which prices are not specified[90], as a *turnover equation* (1973, pp. 883).

[90] See also LINNEMANN (1966, pp. 4-47) for a detailed discussion of this point.

However, price variables are not the only group of specific variables to be included. Indeed, since the previous models seem to provide a reasonably neutral base as to what levels of trade should be, it would be interesting to test for specific groups of countries between which trade is believed to be unusually high or unusually low. To address this kind of questions, most estimates of gravity models add, to all the above specifications, a certain number of dummy variables that test for specific effects. These include, for instance, the membership of a trade arrangement such as the European Union, sharing of a common land border or speaking the same language. Therefore, assuming that we wish to test for *p* distinct effects, the model is then translated by the following equation:

Equation II-9 – Linear stochastic full gravity model

$$\log(M_{ij}) = \alpha + \beta.\log(Y_i) + \gamma.\log(Y_i) + \theta.\log(N_i) + \chi.\log(N_j) + \\ + \delta.\log(D_{ij}) + \sum_{s=1}^{p} \lambda_s.G_{s,ij} + \delta.\log(\eta_{ij})$$

Where the dummy variables equal one if both countries verify the p-th effect and zero otherwise.

Specifically, the classic full gravity model, defined by FRANKEL (1997, pp. 54), includes the baseline gravity model, *per capita* income variables and dummy variables representing a common border and a common language.

Moreover, a new specification of these dummy variables was defined by PAAS (2003, pp. 13) allowing for the interaction between dummy variables. Indeed, until this author's work, the dummies' effect was assumed to be constant, irrespective of the other independant variables such as the partner countries' population and their level of economic development. However, this author allows for such differences by interacting dummy variables and by measuring, for instance, to what extent the bilateral trade flows' dependence on the trade partner countries' size and level of development is different depending on the dummies.

Additionally, a new mathematical specification for the traditional gravity model has been lately reconsidered. In fact, whereas the studies mentioned hitherto have provided with a foundation for the log-linear form, SANSO *et al.*

(1993, pp. 266) have, on the other hand, explored the possibility of deriving a more general functional form of the gravity model from Box-Cox transformations. Indeed, these authors reached the conclusion that the optimal functional form is slightly, yet statistically, different from the loglinear form for every year of the sample. The basic problem is that loglinearisation of the empirical model in the presence of heteroskedasticity leads to inconsistent estimates, due to the fact that the expected value of the logarithm of a random variable depends on higher-order moments of its distribution.

In addition, they propose, in the appearance of a multiplicative form, one unique functional structure suitable for all the sample period, robust to different patterns of heteroskedasticity and, in addition, providing a natural way to deal with zeroes in data[91]. Several other authors[92] have followed this type of specification:

Equation II-10 – Multiplicative Stochastic Full Gravity Model

$$M_{ij} = A.Y_i^{\beta_1}.Y_j^{\beta_2}.N_i^{\beta_3}.N_j^{\beta_4}.D_{ij}^{\beta_5}.\prod_{s=1}^{p} G_{s,ij}^{\beta_S}.e^{u_{ij}}$$

Where the dummy variables equals two if both countries verify the p-th effect and one otherwise.

More recently, MANNING & MULLAHY (2001) and SILVA & TENREYRO (2003, 2004)[93] made use of a Poisson pseudo-Maximum Likelihood estimator (PML)[94] as the last upgrade of the multiplicative model aiming at an alternative methodology to the loglinear one. These authors pay special attention to the so-called *Jensen*'s inequality, which proves that the expected value of the logarithm of a random variable is different from the logarithm of its expected value, therefore leading to the standard practice of

[91] Something problematic when dealing with logarithms.
[92] See also ANDERSON (1979), BRADA & MENDEZ (1983), BERGSTRAND (1985, 1989), FRANKEL & WEI (1993), FRANKEL *et al.* (1995), BEERS & BIESSEN (1996), POLAK (1996), CYRUS (1996), KALBASI (2001) and LAMOTTE (2002).
[93] The former study was related to health economics; whereas the latter is focused in the international trade analysis.

using least squares to estimate economic relationships in logarithms instead of levels to significant biases in the presence of heteroskedasticity.

It must be highlighted that there is a pattern in the direction of the bias generated by OLS. Indeed, this bias tends to be, on one hand, positive for the coefficients on variables that relate to larger volumes of trade and, presumably, to larger variance and, on the other hand, negative for variables that discourage trade and that, possibly, reduce the variance (SILVA & TENREYRO (2003, pp. 21)).

Therefore, contrary to the loglinearised estimations in all their alternative transformations of the dependant variable or the previous multiplicative estimations, the PML estimator passes the RESET robust test (RAMSEY, 1969). Simultaneously, the latter estimator is also relatively robust to the existence of rounding errors and/or zero values of the dependant variable, something particularly common when analysing trade data. However, this estimator does not fully account for the heteroskedasticity effect in the model and all inference has to be based on a WHITE (1980) robust covariance matrix estimator.

To sum up, the PML regression emerges as a reasonable compromise, giving less weight to the observations with larger variance, without giving too much weight to observations more seriously contaminated by measurement errors[95]. For that purpose, we introduce below the alternative multiplicative model in which the PML regression is based (two first equations). The PML estimator is also presented in the last equation:

Equation II-11 – Alternative Multiplicative Stochastic Full Gravity Model according to the Poisson pseudo-Maximum Likelihood estimator

$$y_i = \exp(\beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i}).\eta_i$$

$$E[y_i / x] = \mu(x_i \beta) = \exp(\beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i})$$

(cont.)

[94] See the characteristics of the Poisson regression model, often used to describe count data, on WINKELMANN (1997) and CAMERON & TRIVEDI (1998).

[95] FRANKEL & WEI (1993a, 1993b) and FRANKEL (1997) had previously suggested that large countries (with minor variance and therefore less prone to measurement errors) should be given more weight in the estimation of gravity equations.

Equation II-11 – Alternative Multiplicative Stochastic Full Gravity Model according to the Poisson pseudo-Maximum Likelihood estimator (cont.)

$$\overline{\beta} = \arg\max_{b} \sum_{i=1}^{n} \{y_i(x_i.b) - \exp(x_i.b)\}$$

Where y represents the dependant variable, expressed in absolute terms, x the independant variables (x_1 and x_2, respectively), expressed in logarithms, η is a log-normal random variable with mean one and variance δ_i^2 and i represents each one of the observations. Since, in practice, regression models often include a mixture of continuous and dummy variables, we replicate this feature by defining x_1 as a standard normal variable and x_2 as a binary dummy variable.

At this point, and after having proceeded to the exposition of the baseline gravity model's evolution as regards to cross section data, we will focus our attention on the baseline gravity model's development as regards to panel data.

II.1.4 The Evolution of the Baseline Gravity Model's Specification for Pooled Data

As a step forward, we would like to hereby present the reasons that lead us to go further than Cross-Section estimations.

Some authors such as BREUSS & EGGER (1999) already argued that cross-section estimations of trade potential are not very reliable. They find very large confidence intervals around estimates, making comments as to whether current flows are below or above potential often statistically meaningless.

The main problem with cross-section analysis, pointed out by these authors, is that many trade flows with either abnormally high or abnormally low values are included in the sample, a situation that increases the standard error and yields large confidence intervals. Consequently, valid predictions of the comparative statics from cross-section parameters are only obtained if we are in equilibrium.

Opportunely, these problems are adequately solved by introducing this time-series analysis into the previous cross-section one, either according to a pooled-data analysis or to a panel-data approach - the latter following PIANI &

KUME (2000, pp. 8)[96] -. Furthermore, this approach allows us to significantly increase the number of observations, consequently adding significance to some estimations.

As a result, this extension allows us to capture the relevant relationship among variables over time and, also, to monitor the possible unobservable trading-partner-pairs individual effects, which mostly represent unobservable heterogeneity. The simplest approach to allow for two-dimension gravity models has had as its main tool *pooling* cross sections across time, having as a result one observation per pair of country and year. Therefore, this methodology brings about the following generic equation:

Equation II-12 – Simple Pooled Cross Sections Across Time Model

$$\ln X_{ijt} = \alpha_0 + \alpha_t + \beta_1.\ln Y_{it} + \beta_2.\ln Y_{jt} + \beta_3.\ln N_{it} + \beta_4.\ln N_{jt} + (...) + \varepsilon_{ijt}$$

letting i denote the cross-sectional unit and t the time period.

Note that α_t represents the year dummy variables. Typically, to reflect the fact that the population may have different distributions in different time periods, the intercept is allowed to differ across periods, usually years. This is easily accomplished by including dummy variables for all but one year, where the earliest year in the sample is usually chosen as the base year.

Furthermore, despite the supposed empirical success of the functional forms of the pooled-data-based gravity models, CHENG & WALL (2002, pp. 9) proved, while making use of several specifications, that "*there still is a severe problem with the standard model (...) consistently misestimating the volume of trade for 68% of the country pairs due to heterogeneity biases*". This resulting bias in pooled OLS is sometimes called *heterogeneity bias*, but it is, in effect, a bias caused from omitting a time-constant variable. As a consequence, an alternative approach to pool cross-section-based data across time is to consider that the unobserved factors affecting the dependant variable consist of two types,

[96] See MARTÍNEZ-ZARZOSO & NOWAK-LEHMANN (2001, pp. 7) and EGGER (2000, pp. 25) for a detailed explanation of the reasons behind the use of Panel Data.

namely those that are constant and those that vary over time. Note that this specification constitutes the model known as Non-Observable-Effects Model.

Within this approach, CHENG & WALL (2002) recommended the use of the so-called *Fixed-Effects Model* (FEM), also known as the unobserved effects model, which had been previously inaugurated and developed by GROS & GONCIARZ (1996) and MÁTYÁS (1997). In fact, the latter author referred that "*one important problem with all the gravity models hitherto*[97] *is that they lack dynamics and therefore the possible effect(s) of the business cycle are completely ignored*".

Equation II-13 – Simple Fixed-Effects Model making use of Pooled Cross Sections Across Time (FEM)

$$\ln X_{ijt} = \alpha_0 + \alpha_t + \beta_1.\ln Y_{it} + \beta_2.\ln Y_{jt} + \beta_3.\ln N_{it} + \beta_4.\ln N_{jt} + (...) + a_{ij} + u_{ijt}$$

The variable a_{ij} captures all unobserved, time-constant factors that affect X_{ijt} and it is generically called an *unobserved or fixed effect*. As a consequence, the above model is called an *unobserved effects model*, a *fixed effects model (FEM)* or an *unobserved heterogeneity model*.

The error u_{ijt} is often called the *idiosyncratic error or time-varying error*, because it represents unobserved factors that change over time.

Note that ε_{ijt} (represented in Equation II-12) = a_{ij} + u_{ijt}, is often called a *composite error*.

However, note that this method of pooling all the years involved has one important drawback. In fact, in order for pooled OLS to produce a consistent estimator of the right-handed variables, we would have to assume that the unobserved effect a_{ij} is uncorrelated with the latter.

On the contrary, the purpose of this functional form of the gravity equation in most applications is to allow for heterogeneity in the regression equations by letting the unobserved effect a_{ij} to be correlated with the explanatory variables[98]. With such heterogeneity, a country would export different amounts to two countries, even though the two export markets have the

[97] With the exception of BALDWIN (1994).

same income and are equidistant from the exporter. This can be due to the existence of historical, cultural, ethnic, political, or geographic factors that affect the level of trade, and that are correlated with the gravity variables income, population and distance.

Furthermore, it is extremely difficult to exhaustively imagine which variables might eliminate the problem. Indeed, the use of dummy variables for controlling for this bias is often difficult to measure. In this sense, "*fixed-effects modelling is a result of ignorance*", following CHENG & WALL (2002, pp. 10). This is why it is important to control for these factors using a FEM that assumes that there are fixed pair-specific factors that may be correlated with levels of bilateral trade and with the right-hand-side variables.

Empirically, since we are not acquainted with the variables responsible for the heterogeneity bias, we simply would allow each trading pair to have its own dummy variable[99].

Equation II-14 – Augmented Fixed-Effects Model making use of Pooled Cross Sections Across Time

$$\ln X_{ijt} = \alpha_0 + \alpha_t + \alpha_{ij} + \beta_1.\ln Y_{it} + \beta_2.\ln Y_{jt} + \beta_3.\ln N_{it} + \beta_4.\ln N_{jt} + (...) + u_{ijt}$$

Where α_{ij} is the specific "country-pair" effect between the trading partners, which is constant across country pairs and over time. These country-pair intercepts include the effects of all omitted variables that are cross-sectionally specific but remain constant over time, such as distance, contiguity, language or culture[100]. Note that the FEM is a two-way FEM in which the independant variables are assumed as correlated with α_{ij}.

An added benefit of the FEM is that it eliminates the need to include distance in the regression. At this respect, it avoids any long-standing problem with determining the

[98] This heterogeneity is extremely likely to take place, starting from simple divergences in recorded country statistics such as GDP.

[99] See also GLICK & ROSE (2001), PAKKO & WALL (2001) and EGGER (2002).

[100] Oddly, WEI & FRANKEL (1997, pp. 125) reject the inclusion of country-pairs dummies *a priori* on the basis that doing so would undermine the efforts of estimating the effects of variables that are constant over the sample period. Presumably, their concern is that because these variables are subsumed into the country-pair effects, they are hidden from analysis. This is unfounded because the effects of these variables are easily estimated by regressing them on the country-pair effects from the FEM. Specifically, where the estimates of all the country-pair effects are denoted as α^{+}_{ij}, and including the log of distance and the contiguity dummies as independant variables as it follows:

$$\alpha^{+}_{ij} = \varphi_0 + \varphi_1.\ln D_{ij} + \varphi_2.\ln Adj_{ij} + \varepsilon_{ij}$$

appropriate measure of economic distance so as to capture transportation and information costs (see HEAD & MAYER (2001)).

To sum up, some of the main forces behind the fixed export effects should be tariff policy measures and export driving or impeding "environmental" variables (including size of country, access to transnational infrastructure networks or geographical and historical determinants).

Moreover, consistent series of all the above-mentioned explanatory variables tend to be relatively short. Thus, irrespective of the referred endogeneity problem, the OLS estimation will be biased, given that the time-series is short within a pooled data approach (see NICKELL (1981)).

Additionally, we assume that the gravity equation for a country pair may have a unique intercept, and that it may be different for each direction of trade, i.e. $\alpha_{ij} \neq \alpha_{ji}$[101]. Furthermore, it could be interesting to give each country its own intercept. However, some authors such as FRANKEL (1997, pp. 52) found the results to be unreliable when testing country and bloc effects at the same time, implying that such an approach is unnecessary.

Interestingly, this traditional approach is still affected by a severe problem of misspecification as showed by MÁTYÁS (1997)[102]. This author noted that the most natural representation of bilateral trade flows is a FEM's three-way specification[103]. In addition, it allows us to separately identify those countries that have strong propensities to export and import, after accounting for divergences in other factors such as income and population[104].

[101] Otherwise, we would be in the presence of the so-called Symmetric Fixed-Effects Model.
[102] MÁTYÁS (1998, pp. 397) also suggests an alternative specification of the gravity models tailored for "world models" and large data set.
[103] For a complete and detailed exposition of the six restriction models that can be inferenced from the general equation see CHENG & WALL (2002, pp. 4). The Three-Way FEM's functional form (XFE) is just one of them. Unexpectedly, these authors conclude that the XFE coefficients are identical to those from the FEM, although their standard errors are much larger. As a consequence, they recommend the use of the FEM on the basis of a standard goodness-of-fit criteria (pp. 14).
[104] See MÁTYÁS *et al.* (2000) for a detailed analysis.

Equation II-15 – Augmented Triple Fixed-Effects Model making use of Pooled Cross Sections Across Time (XFE)

$$\ln X_{ijt} = \alpha_0 + \alpha_i + \gamma_j + \lambda_t + \beta_1.\ln Y_{it} + \beta_2.\ln Y_{jt} + \beta_3.\ln N_{it} + \beta_3.\ln N_{jt} + (...) + \varepsilon_{ijt}$$

Where α_0 is common to all years and country pairs; α_i is the local or exporting country effect (i = 1,…, n); γ_j is the target or importing country effect (i = 1,…, n+1); λ_t is the time (business cycle) effect (t = 1,…, T); the $n+1^{th}$ element represents the rest of the world or, if a world model is taken, the last element is n and u_{ij} is a white noise disturbance term.

Firstly, the *local specific parameters* show the time invariant export country effect, i.e., how efficient a given country is in exporting relatively to the other countries in the sample, but also relatively to its given size. Furthermore, they allow countries to have different propensities to export, after controlling for divergences across, for instance, GDP.

Secondly, the *target specific parameters* show the time invariant import country effect, i.e., allow countries to have different propensities to import, after controlling for divergences in main variables. They simultaneously cover two areas of the economy, namely that there are no major administrative hurdles making foreign trade difficult and also that there are no financial obstacles that are capable to keep imports down.

When both of these effects are large for most of the countries within a trading bloc relative to the other countries outside the bloc and they are statistically significant, one can interpret for the existence of a significant trading bloc effect.

Lastly, the *time specific effect*, reflecting the common business cycle, the inflation course or the globalisation process over the whole sample of countries, is specific to year t and common to all pairs.

Eliminating one of the three dimensions would expectedly imply that convenient OLS estimates are very likely to result in inconsistent and biased estimates, namely that the effect of both domestic and foreign income is biased upwards, following HARRIS & MÁTYÁS (2001, pp. 5). This implies that the conclusions on OLS-based trade potentials are problematic and affect both the in-sample and the out-of-sample prediction concept[105].

Note also that the above equation can be interpreted as the generalisation from which others specific function forms can be inferred (T=1 and implicit restriction $\lambda_i = 0$ imply Cross Section, N=1 and implicit restriction $\alpha_i = 0$ imply Time Series and no restrictions implies Pooled Data).

> Unfortunately, none of the applications of this model have so far bothered taken into account the local, target and time effects, implying that all authors were involuntarily imposing the unnecessary restrictions $\alpha_i = \gamma_j = \lambda_t = 0$ for all i, j and t.

In addition, it may be more appropriate for some data sets to formalise these α, γ, and λ specific effects as random variables into the error term - *error components approach* or *Random-Effects Model* (REM)[106] - in spite of being treated as fixed parameters. Namely MÁTYÁS (1998) refers that when the number of countries is large, there is not a parsimonious approach and it would be better to take these effects as non-observable random variables, in order to avoid the loss of too many degrees of freedom. In addition, strictly for policy reasons, the REM may be preferred, as the effects of the explanatory variables are not diminished by the presence of a relatively large set of dummy variables. Furthermore, the REM has the additional advantage of being more efficient when compared to the XFE, if all the conditions hold.

Nonetheless, if the purpose of the analysis is to calculate the specific values of time, target and source country effects and to forecast export flows, they should be treated as fixed-effects and estimated[107]. Moreover, whereas the XFE is always consistent in the absence of endogeneity of errors in variables, the REM is only consistent if the orthogonal conditions of white noise are fulfilled for the error term and there is no correlation of the individual effects with the regressors, following EGGER (2002) conclusions. Therefore, if it were thought that any of the explanatory variables would be likely to be correlated with these unobserved effects, the use of a fixed-effects approach would avoid any subsequent endogeneity bias.

Apart from this, a straight association can be made between the fixed-effects and the random-effects estimators with short-term and long-term time-

[105] In the case of EGGER's estimations (2002, pp. 299), the single and the two-way FEM result in large unused trade potentials at least in intra-CEEC trade.
[106] See HARRIS & MÁTYÁS (1998, pp. 2) as containing the first ever results of a REM.
[107] Following these trends, whereas MÁTYÁS *et al.* (2000), EGGER (2000), MARTÍNEZ-ZARZOSO & NOWAK-LEHMAN (2001) and CHENG & WALL (2002) chose one of the fixed-effects models, BALDWIN (1994), GROS & GONCIARZ (1996), HARRIS & MÁTYÁS (1998, 2001) and GARCÍA-

horizons when comparing results following PIROTTE (1999) and EGGER (2002). Whereas consistent fixed-effects (and consequently random-effects) estimates reflect short-run parameters, an intermediate model assuming no autocorrelation of the error term estimates would be closer to long-run parameters.

The decision between the use of XFE and REM can be also based in HAUSMAN (1978) or HAUSMAN & TAYLOR (1981) simple tests aiming at the identification of the orthogonality of the random effects and the regressors[108], which are automatically supplied by the econometric package TSP. However, HARRIS & MÁTYÁS (1998, pp. 16) had previously concluded that, quantitatively, there is little difference between these alternative choices and therefore "*model selection tend to be a more subjective nature*" related to the analysis of the inherent main objectives as referred above.

Lastly, in the REM case, all the structural parameters of the model are assumed to be the same across the totality of the sample, implying that additional assumptions are necessary to achieve a tractable analytical form. Within this context, MÁTYÁS (1998, pp. 399) stated that Feasible Generalised Least Squares should estimate this model. Alternatively, HARRIS & MÁTYÁS (1998, pp. 4; 2001, pp. 11) suggested that the method of Instrumental Variables, which will be further discussed in this section, should be chosen regarding the likely endogenous explanatory variables, with the exception of population, which appears to be strictly exogenous. For this purpose, the authors use lags of the endogenous variables as their instruments.

Indeed, we still have to solve a correlation problem between the unobserved effect a_{ij} and the right-handed variables for pooled OLS, in spite of the fact that it would be economically attractive to allow for such a correlation.

MENÉNDEZ *et al.* (2000) alternatively opted for the REM. Appart from this, MÁTYÁS (1997, 1998) does not give preference to the one of the models over the other or vice-versa.

[108] See as examples HARRIS *et al.* (2000), MARTÍNEZ-ZARZOSO & NOWAK-LEHMAN (2001), EGGER (2000, 2002) and CHENG & WALL (2002).

One way of solving this drawback would be an alternative specification of the FEM, consisting in the estimation of the gravity equation in first differences[109].

This method has the advantage of eliminating the effects of possible auto correlated disturbances, controlling at the same time for heterogeneity. However, the results obtained are similar in order of magnitude and sign of the coefficients and, moreover. They avoid any conclusion on the fixed effects.

Equation II-16 – First Differenced Model making use of Pooled Data

$$\Delta \ln X_{ij} = \Delta\alpha_t + \beta_1.\Delta \ln Y_i + \beta_2.\Delta \ln Y_j + \beta_3.\Delta \ln N_i + \beta_4.\Delta \ln N_j + (...) + \Delta u_{ij}$$

Where Δ denotes the change between contiguous t.
The unobserved effect a_{ij} and the dummy variables do not appear, because they have been differenced away. The above intercept corresponds to the change between contiguous intercepts in t.

Thus, we have solved the original problem by allowing the explanatory variables to be correlated with the unobservable effects that are constant over time (since they have been wiped away from the regression).

Notwithstanding, the use of the first-differences implies that we cannot directly estimate variables that do not change over time because the inherent transformation wipes out such variables. Nevertheless, these variables can be easily estimated in a second step, running another regression with the individual effects as the dependant variable and with distance and dummies as the explanatory variables.

Another major problem is that the key assumptions still have to be satisfied. The most important of these is that Δu_{ij} is uncorrelated with the variation of the explanatory variables. This assumption holds, once again, if the idiosyncratic error at each time is uncorrelated with the explanatory variable in both of the periods involved in the variation. This is, as referred by WOOLDRIGE (2003, pp. 440) "*another version of the strict exogeneity assumption*".

[109] Following MARTÍNEZ-ZARZOSO & NOWAK-LEHMANN (2001, pp. 9-10).

Therefore, this potential correlation will have to be tested due to the likely existence of a simultaneity bias in terms of endogeneity between at least some of the explanatory variables with respect to the random noise[110], making use of the Instrumental Variables method (IV)[111]. Indeed, its more specific method, known as the Two Stage Least Square (2SLS), was referred by WOOLDRIDGE (2003, pp. 484) as "*second in popularity, only to OLS for estimating linear equations in applied econometrics*".

Equation II-17 – Instrumental Variables method according to the Two Stage Least Square Estimator making use of Pooled Data

$$\ln X_{ij} = \alpha_t + \beta_1.\ln DIST_{ij} + \beta_2.\ln Y_i + \beta_3.\ln Y_j + \beta_4.\ln N_i + \beta_5.\ln N_j + (...) + u_{ij}$$

Note that there are two kinds of independant variables in the above equation. On one hand, there is the Y_i variable, which is suspected of being correlated with u_{ij}[112]. This correlation brings about the estimators to be biased and inconsistent when estimated by OLS. On the other hand, there are the rest of the variables, which are intended to be strictly exogenous to the model. Also note that u_{ij} must have zero as its expected value.

Within this approach, we aim to solve this methodological problem by seeking other exogenous variables that are able to fit as instrumental variables for the Y_i variable. For that purpose, the existent correlation between each one of the instrumental variables and its correspondent explanatory variables must be computed in terms of partial correlation. The easiest way is to write the endogenous explanatory variable as a linear function of all the exogenous variables, the instrumental variable and an error term.

$$\ln Y_i = \alpha_t + \gamma_1.\ln DIST_{ij} + \gamma_2.\ln N_i + \gamma_3.\ln N_j + (...) + \gamma_{1b}.\ln \hat{Y}_i + v_{ij}$$

Where $\hat{Y}_i$ variable denotes the instrumental variable.

Thus, to describe this approach, the final regression model becomes as it follows.

$$\ln X_{ij} = \alpha_t + \beta_1.\ln DIST_{ij} + \beta_3.\ln Y_j + \beta_4.\ln N_i + \beta_5.\ln N_j + (...) + \beta_2.\ln \hat{Y}_i + e_{ij}$$

[110] This model cannot be consistently estimated by OLS, Generalised Least Squares or Feasible Generalised Least Squares as the lagged dependant variable is likely to be correlated with the composite disturbance terms.

[111] Note that we now turn to be interested just in allowing just one observation per pair of countries, instead of considering one observation per pair of country and year.

[112] Several factors may be under this assumption, namely the existence of omitted variables correlated with Y variables or also the existence of measurement errors in the explanatory variables.

Some special features of the 2SLS must be also borne in mind. First and foremost, unlike in the case of the OLS, the computation of a standard R-squared following the IV estimator may result in a negative value, where the sum of the squared IV residuals can actually be larger than the total sum of squares. In the same way, the latter R-squared cannot be used in the usual way to compute F tests of joint restrictions. Therefore, we would always use OLS if our goal is to produce the largest R-squared.

In fact, IV methods are intended to provide better estimates of the inherent *ceteris paribus* effects when some explanatory variables and the random noise are correlated. Consequently, goodness-of-fit is not a factor and, on the contrary, a high R-squared resulting from OLS must be of little comfort if we cannot consistently estimate the relevant coefficients, accordingly to WOOLDRIDGE (2003, pp. 495).

Interestingly, several other methods have also been used, aiming at solving the endogeneity and autocorrelation problem existent in the pooled-data gravity models and, therefore, these must also be mentioned as an alternative to the IV specification.

As a starting point, recommendations made by HANSEN (1982) and PAGAN & VELLA (1989) may be highlighted in defense of the Generalised Method of Moments (GMM) as an alternative option within a linear approach [113]. Additionally, the Feasible Generalised Least Squares (FGLS) may also have appeared as an adequate alternative to the IV method.

However, the Poisson pseudo-Maximum Likelihood estimator (PML) has been also presented by SILVA & TENREYRO (2003, 2004) as a better alternative to the Ordinary Least Squares Estimator, the Fixed-Effect Model, the Random-Effect Model, the Instrumental Variables Model, the Generalised Method of Moments and the Feasible Generalised Least Squares.

[113] Also by AHN & SCHMIDT (1995), CRÉPON *et al.* (1996) and HARRIS & MÁTYÁS (1996) specifically regarding to the GMM related to dynamic panel data linear models.

In this respect, it must be mentioned that the PML cannot only be applied to cross-sections, but also to pooled data. In fact, the PML method appears to obtain excellent empirical results in terms of the RESET test when compared to the rest of the models considered in this dissertation, accordingly to SILVA & TENREYRO (2003, 2004). We will endeavour to reproduce these same results to our pooled databate of trading flows later on in the following chapter.

As a final note, a comment must be made to underline the permanent necessity of testing for heteroskedasticity in all the above-developed regressions. For that purpose, the recommendation is the adoption of the WHITE (1980)'s test.

II.1.5 The Evolution of the Baseline Gravity Model's Specification for Panel Data

The pooled-data-based is not the only approach to gravity models making use of both time and space dimensions. Indeed, instead of considering one observation per pair of country and year, we would be interested in allowing just one observation per pair of countries. This proposal is known as *panel format*.

This panel-data approach[114]. also known as longitudinal data, appears as a step forward to the pooled-data proposal previously tackled on. It represents a closer projection of verified trading flows, since either importing or exporting flows are highly correlated to their respective values in previous periods of time.

At this respect, all the previous methods referred as regards to the pooled-data approach are still valid when applied to panel data. Nonetheless, their application needs to inherently put much more attention on the heterogeneity and endogeneity problems that could arise from this upgrade.

It must be yet borne in mind that the key factor that determines the choice between the two pooled and the panel methods is the statistical assumption of

[114] In the same sense other authors such as SRINIVASAN & CANONERO (1993), BALDWIN (1994), ZHANG & GETIS (1995), GROS & GONCIARZ (1996), MÁTYÁS (1997, 1998), HARRIS & MÁTYÁS (1998), LIMAM & ABDALLA (1998), MÁTYÁS *et al.* (2000), HARRIS *et al.* (2000), EGGER (2000, 2002), GARCÍA-MENENDEZ *et al.* (2000), WALL (2000), BEERS & BERGH (2000), HARRIS & MÁTYÁS (2001), MARTÍNEZ-ZARZOSO & NOWAK-LEHMANN (2001), CHRISTIE (2002), CHENG & WALL (2002), THARAKAN (2002), LAMOTTE (2002) and SILVA & TENREYRO (2003, 2004) chose making use of this approach.

conditional independence. Indeed, when independence across both dimensions, time and space, is assumed for all the observations, the pooled format must be adopted. Otherwise, when independance is just assumed in one direction, the panel format must be the correct choice.

The panel-data approach will not be appropriately developed in this dissertation due to lack of time. However, further efforts will be made later on at this respect on what concerns to this panel-data approach, mostly by making use of the PML estimator.

II.1.6 The Evolution of Data Application, Variables and Units

Questions on how to measure the concepts of economic mass and economic distance arise as soon as one makes the analogy from NEWTON's gravity law to the corresponding gravity model for trade.

Moreover, a rich set of variables has been used throughout the vast amount of studies making use of a gravity model. Consequently, it would be interesting to analyse their empirical success, aiming at their feasible introduction within our dissertation.

Importer or Exporter Economic Masses

On what concerns the importer or exporter economic masses as already settled in the Equation II-1, these could be interpreted as alterations of expenditure capabilities.

Thoroughly, the income on the supply side (Y_i) will be considered as the potential supply of the exporting country. In other words, it is a measure of productive capacity and assumed to be positively related to the traded flows. On the other hand, the income on the demand side (Y_j) will be considered as the potential demand of the importing country, implying the measurement of the absorptive capacity and assumed to be positively related. The coefficients of both the income variables are assumed as approaching one from below[115], assuming a tendency of trade to rise less than proportionately with economic size.

[115] See BIKKER (1987), ARNON *et al.* (1996, pp. 127) or FRANKEL (1997, pp. 58).

It should also be noted that the gravity model is a single equation model that considers income to be exogenous, consequently implying that there is no scope for export-led growth.

Within this approach, several authors[116] have found that the income coefficient is a little larger (although often statistically insignificant) for the importing country than for the exporting country. This coefficient is consistent with the Keynesian idea of a demand-determined marginal propensity to import, expressed in elasticity form.

However, this interpretation is not so straightforward as it presents a few areas of disagreement between the several authors. Firstly, there is the distinction between income calculated at market exchange prices (MER) and income calculated at Purchasing Power Parity (PPP)[117]. Whereas the PPP-based GDPs provide the best comparisons in terms of consumers' welfare between different countries and avoid large swings in MER values, MER-based GDPs provide the best comparisons in terms of the external importance of different countries in international economic relations and avoid PPP measurement errors.

In fact, GROS & GONCIARZ (1996) defended that a real appreciation of the MER will take place following potential trade turnovers and, consequently, PPP-based GDPs are underestimated, as they do not take into account this appreciation (and vice versa). Therefore, it would be interesting to use MER-based GDPs when aiming at calculating potential trade[118].

However, LINNEMANN (1966) had already found that the choice between these two measures makes little difference for the final results obtained, except for the coefficient of income itself.

[116] See, for instance, FRANKEL (1997, pp. 140).
[117] Whereas GROS & GONCIARZ (1996) and FRANKEL (1997) consider that trade potentials should be based on the international value of goods and services and not on the welfare of its people, BALDWIN (1994), BAYOUMI & EICHENGREEN (1995), BEERS & BIESSEN (1996), BOISSO & FERRANTINO, PIANI & KUME (2000) and PAAS (2002) make use of income at PPP.
[118] The simultaneous inclusion of both measures brings about clear problems of multicollinearity.

Secondly, the assumption of GDP as the axiomatic indicator for measuring income is faced with the alternative use of GNP[119]. However, this alternative measure is mostly used due to the availability of data. Indeed, as LINNEMANN (1966) pointed out, as regards to exports, "*domestic product is, no doubt, the more proper concept because all domestically produced goods that leave a country are counted as exports, whether produced by national or foreign factors of production*".

Additionally, CHRISTIE (2002) more recently contributed to this discussion by creating a third approach of thought. Indeed, his main contribution was the inclusion of potential GDP, generated by a partial absorption of unemployment, to the levels of the CEEC, under the assumption of constant average labour productivity. However, this innovation was due to the fact that the regional[120] levels of income were below their long-term potential, influenced by the existence of an important economy of war, a few years ago, and by a huge informal sector, nowadays. Moreover, trade between these States often takes place at non-international prices. Fortunately, this is not the case of the CEEC for the period here considered (these statements are just lightly correct for Romania and Bulgaria).

Importer or Exporter Per Capita Economic Masses

Regarding either importer or exporter per capita economic masses, changes in per capita income could be interpreted as alterations of taste preferences *à la LINDER*[121]. In addition, there are reasons to believe that per capita income has a positive effect on trade for a given size. Indeed, according to FRANKEL & WEI (1993a, pp. 6), "*as countries become more developed, they tend to specialise more*" and GROS & GONCIARZ (1996, pp. 713-714) consider that, "*as income increases, the share of tradables (exports and imports) in overall income might increase*".

[119] See PÖYHÖNEN (1963), SAPIR & LUNDBERG (1984), LINNEMANN & BEERS (1988), FRANKEL & WEI (1993a), OGULEDO & MACPHEE (1994), FRANKEL (1997), LIMAM & ABDALLA (1998) and GARCÍA-MENÉNDEZ *et al.* (2000) as examples of extensive use of GNP.
[120] In this case, the levels of income referred are the levels of income of the countries in the region of the Balkans.

One possible explanation for the independant effect of per capita income is that exotic foreign varieties are superior goods in consumption. Other possibilities, however, are derived from the literature on endogenous growth. Following this theory, the process of development may be led by the innovation or invention of new products that are then demanded as exports by other countries. It has also been suggested that the more developed countries have more advanced transportation infrastructures, which facilitate trade. Finally, and perhaps the most important reason industrialised countries trade more than less developed countries, countries tend to liberalise as their economy develop (see FRANKEL (1997, pp. 58)).

On the other hand, the difference in coefficient between importer and exporter per capita incomes is larger and more significant than the analogous absolute income difference, with the exporting country having the higher value (see FRANKEL (1997, pp. 141).

At this point, it would be important to highlight the likelihood of existence of endogeneity between income and per capita income, transferred through the level of trade, as FRANKEL (1997) does. For tackling this problem, variables such as Labour Force, Stock of Physical Capital and Stock of Human Capital appear as exogenous and thus as good instrumental variables (see CYRUS (1996))[122]. However, the obtained results are not different from the previous ones.

Additional Measures of a Country's Size

Among the variables introduced as additional measures of the country's size in the augmented gravity model - Equation II-4 -, population appears in a key position. More heavily populated countries are assumed to be larger in area and thus endowed with a greater quantity and variety of natural resources. Whereas this greater self-sufficiency leads, on one hand, to less reliance on international trade, a large domestic market promotes the division of labour and,

[121] See BERGSTRAND (1989, pp. 152).
[122] WEI (1996) also allows for the endogeneity of income in the gravity model, using simple population as an instrument variable.

thus, creates opportunities for trade in a wide variety of goods and also compensates foreign suppliers for the fixed costs of entry. Therefore, the effect of population variables on trade is indeterminate.

However, according to BERGSTRAND (1989), a positive (negative) sign for the coefficient of the exporting country's population indicates that exports tend to be labour (capital) intensive, whereas a negative (positive) sign for the coefficient of the importing country's population indicates that exports tend to be luxury (necessity) goods.

Finally, it can be concluded that the population of the exporting and of the importing country, (Ni) and (Nj) respectively, are considered to be a good approximation for the effect of economies-of-scale.

Distance

Related to the intensity of trade[123], the variable distance is defined as a proxy of the resistance to trade that several transportation costs represent (namely monetary time-uncertainty-related costs and also psychic-cultural and market unfamiliarity-related costs[124]) and obviously negatively related to trading flows. Several measures were applied to define distance.

The most popular way of measuring distance has been the geodesic distance[125] between capitals, as a proxy for the economic centre of a country[126]. However, geodesic distance between capitals, although broadly a reasonable

[123] Following LINNEMANN & BEERS (1992) nomenclature. The term intensity of trade is used to indicate that the analysis abstracts from the economic size of trade patterns as reflected in the total volume of their exports and imports. In fact, the economic variables are seen as scale factors with which the intensity has to be multiplied in order to determine the absolute magnitude of the trade flow.

[124] Indeed, FRANKEL (1997, pp. 73), BOUGHEAS *et al.* (1999) and MARTÍNEZ-ZARZOSO (2001, pp. 12) findings confirm that monetary costs are not necessarily the most important component of costs associated with distance. Interestingly, CHRISTIE (2002) attempts to take better account of specific transport costs by making use of a transport time matrix between the main transport nodes of CEEC. The main hope behind this procedure is to take better account of problems such as infrastructure quality or border waiting times. Conclusions show that this specific variable only outperforms traditional distance measure on a few flows (pp. 22), since the latter "*captures more complex phenomena than it would seem at first glance*".

[125] Also known as "*as the crow flies*", which is technically defined as the great-circle distance between the two latitude-longitude combinations.

[126] Some authors, such as CHRISTIE (2002), substitute the capital with a major city that seems to be closer to the country's economic center of gravity (a triangle linking Frankfurt, München and Berlin instead of the latter in the German case). However, BOISSO & FERRANTINO (1996) found very little difference in gravity equation results whether distance is a measure between the most populous cities or the geographical centers.

idea, does not take sufficient account of a whole series of trade impediments that surely matter, such as real transport costs, complex orography, tariff and non-tariff barriers, waiting times at borders, transport infrastructure quality or differences between maritime, road or train costs. Moreover, measuring distances between capitals may not always be a good idea (Austria and Slovakia, whose capitals are very close is a case in point).

As regards to the quality of infrastructure, some authors introduce a variable representing infrastructure endowment[127] and the results seem to be encouraging.

In addition to the absolute distance measure, POLAK (1996) suggested the introduction of a variable regarding *Relative Distance*[128], also known as remoteness. According to this author, the gravity model only taking into account bilateral absolute distances tends to overestimate the flows that take place in the defined *trade-economic centre* (calculated, later on, following SMARZYNSKA JAVORCIK (2001)'s method). It consequently underestimate the flows that take place between countries geographically isolated from the trade-economic centre, implying large positive residuals[129].

Moreover, POLAK also highlighted two feasible interpretations for the term of relative distance. Firstly, it can be seen as the total negative effect on the trade flows resulting from all the bilateral distances or, alternatively, it can be interpreted as a measure of the relevant average distance between a certain country and its trade partners, with weights determined by the trade capacities of the latter. The common hypothesis is that the remoteness of two countries in relation to the trade-economic centre has a positive effect on the bilateral trade volume (also conditional on bilateral distances).

[127] See GARMAN *et al.* (1998), LIMÃO & VENABLES (1999) and BOUGHEAS *et al.* (1999). Moreover, MARTÍNEZ-ZARZOSO & NOWAK-LEHMANN (2001) are the pioneers introducing infrastructure endowment in a panel data analysis.

[128] See also SMARZYNSKA JAVORCIK (2001), SOLOAGA & WINTERS (1999) and PIANI & KUME (2000) and also FRANKEL (1997, pp. 65-70) and DEARDORFF (1998) from a theoretical approach.

[129] Consequently, these large residuals could find home in a virtual dummy variable covering the CEEC, which would appear overestimated in the form of a phantom preferential trade area (see POLAK (1996, pp. 537-541)). The author defends, as a feasible explanation, that the low elasticity of total imports with

In the past, LINNEMANN (1966) calculated a location index as a measure of remoteness later renewed in POLAK's approach, being the purpose to measure how favourably a country was located in relation to international trade.

Several other methods for measuring the variable distance were taken into consideration during the last years. Namely, it was firstly attempted to distinguish between road, train, air and sea routes[130]. However, this approach did not shed a great deal of additional light on the subject and, furthermore, the air routes, which, according to FRANKEL (1997), are the main routes used internationally, are the major justification for using the geodesic distance.

The latter author also checked for possible non-linearity in the log-distance term, but concluded that the additional inclusion of information in the model had added little value[131]. Furthermore, several authors such as SCHUMACHER (2001, pp. 28) and GRAY (2001) presented, in their conclusions, different formulas for calculating geodesic distances making use of latitude and longitude coordinates.

Apart from this, the conclusion found by KALBASI (2001, pp. 8) must also be highlighted. The author suggests that the distance obstacle to trade flows is relatively low in the trade flows among developed countries, reflecting the fact that transportation and communication costs are also lower in developed countries than among less developed countries.

Note as a reminder that, according to the already referred fixed-effect model approach, the need to include a distance variable in the gravity model is avoided, as this model controls for all variables that do not change over time. In this respect, note that at least one study making use of the FEM allows the coefficients on distance and other variables to vary from country to country (DHAR & PANAGARIYA (1995). If one believes that distance has a bigger effect (e.g. transport costs are higher per kilometre, even after holding constant

respect to distance should not be incompatible with a relatively high elasticity of substitution between imports from alternative sources of supply.

[130] See WANG (1992), WINTERS & WANG (1994), FRANKEL *et al.* (1995), FRANKEL (1997), KALBASI (2001) and PAAS (2002).

[131] Moreover, quadratic and cubic terms were not significant alongside the gravity equation (see FRANKEL (1993)).

for *per capita* income and the other variables) for some countries' trade than others, it is correct to allow for such a difference.

Commodity Composition of Trade

Also as a variable related to the measurement of the intensity of trade, the CCT variable is defined as the degree of similarity between the export structure of the supplying country and the import structure of the importing country and assumed to be positively related. Thus, this variable has turned to be a factor that needs to be inexorably taken into account.

Interestingly, LIMAM & ABDALLA (1998) introduced a variable measuring the export concentration ratio between export structures as an indicator of the exporting economy's diversification level and, subsequently, the export potential in terms of meeting the demand for a wide range of commodities. This "*diversification structure of trade*" variable can be interpreted as a pseudo-CCT measure but it already denotes the high concern of these authors about the existence of complementary trade structures as a strong determinant of trade relations.

Price Variables

After these size and intensity variables were introduced, several other variables were also added. The first additional group of variables to be referred here will be the Price Variables. The first author to introduce these variables was BERGSTRAND (1985, 1989), as already referred in Equation II-8.

More recently, wholesale price indexes, consumer price indexes and exchange rates were specifically introduced as price variables by OGULEDO & MACPHEE (1994)[132] following BERGSTRAND. Their coefficients cannot be signed *a priori*, since all of them depend on the elasticity of substitution among importable goods, on the elasticity of transformation between exportables as well as on the elasticity of transformation between the production for domestic market

[132] Other authors introduced in the gravity equation at least one of these variables, namely ABRAMS (1980), THURSBY & THURSBY (1987), FRANKEL (1997), HARRIS & MÁTYÁS (1998), SOLOAGA & WINTERS (1999), MÁTYÁS *et al.* (2000), MARTÍNEZ-ZARZOSO & NOWAK-LEHMANN (2001) or EGGER (2002).

and the production for foreign markets (OGULEDO & MACPHEE (1994, pp. 115)).

However, following FRANKEL's (1997, pp. 140-142) statements, "*these studies tend to get unsatisfactory results for the price terms*"[133], mostly in the case of variables measuring the volatility of either nominal or real exchange rates. Indeed, the proliferation of currency-hedging instruments during the last decades has made this effect become statistically insignificant.

LINDER and HESCHKER-OHLIN theories

Several other variables were additionally added aiming to test the LINDER and HESCHKER-OHLIN theories, as already referred above – See Equation II-5 -, both in terms of inequality per capita incomes or factor endowments. It should be noted that the empirical results of the gravity equation point out that LINDER's hypothesis are overwhelming when compared to HESCHKER-OHLIN premises, particularly in terms of income differentials coefficients[134].

Special Linkages

Several other variables were also added regarding Special Linkages between the trading countries. Indeed, linkages such as linguistic, historical and cultural links are particularly important in reducing what FRANKEL (1997, pp. 54) called "*the cost of unfamiliarity with international markets*", LINNEMANN (1966) called "*psychic costs*" and GARNAUT (1994) called "*subjective resistance*".

Starting with *Historical Linkages*, a growing empirical literature has already found that historical connections such as colonial links are important

[133] BOISSO & FERRANTINO (1993) achieved the same kind of conclusions and also BERGSTRAND (1985, 1989) stated that the price estimated coefficients were usually not statistically significant, despite of their importance in theory.

[134] The results are not quite as bleak for HESCHKER-OHLIN as was the negative coefficient on income differentials following FRANKEL & WEI (1993b, table 5) and FRANKEL, STEIN & WEI (1995, table 4) findings. In fact, there is some support for some of these terms, especially for Capital/Labour ratios and educational attainment.

determinants of international trade flows[135]. Indeed, these authors state that a common historical background brings about relatively homogeneous populations, similar tastes and habits and linked regional economies.

Within this approach, it would also be important to remind the main role played by the trade historical background on the constitution of lagged flows – See Equation II-7 -.

Regarding the *Linguistic Links*, several authors have also proved its importance in explaining trade flows[136], in terms of comparing its effects with those caused by sharing a common border. BOISSON & FERRANTINO (1996) constructed a new measure of linguistic distance that is a continuous scalar rather than a discrete dummy variable, thereby taking into account linguistic diversity within countries. For that purpose, they generate the percentage of the population in a given country speaking a specific language and then construct an index of linguistic dissimilarity for each pair of countries.

As regards to *Currency Links*, the main idea is that they reduce the uncertainty and monetary costs of doing business[137]. Within this approach, some authors have opted to make use of a variable representing foreign currency reserves, namely HARRIS & MÁTYÁS (1998) or MÁTYÁS *et al.* (2000).

In addition, regarding *Ethnic Links*, several authors such as THARAKAN (2002) and CHRISTIE (2002) have stressed the role played by co-ethnic networks and ethnic minority groups in influencing bilateral trade, particularly in terms of creating differentiated product demand[138].

Reciprocity

Some authors also consider the reciprocity variable as a determinant in establishing trade flows. LIMAM & ABDALLA (1998) were the pioneers of

[135] See as examples FRANKEL, STEIN & WEI (1995), FRANKEL (1997), EICHENGREEN & IRWIN (1998), SILVA & TENREYRO (2003, 2004) and PAAS (2003).
[136] See GERACI & PREWO (1977), FRANKEL & WEI (1993a), ARNON, SPIVAK & WEINBLATT (1996), FRANKEL (1997), PIANI & KUME (2000), EGGER (2002), CHENG & WALL (2002), THARAKAN (2002) and SILVA & TENREYRO (2003, 2004).
[137] There have been quite a few studies of the effect of exchange rate uncertainty on bilateral trade, namely THURSBY & THURSBY (1987), DE GRAUWE (1988) and BRADA & MENDEZ (1988), referred in FRANKEL (1997, pp. 137).
[138] See also GOULD (1994), RAUCH & CASELLA (1998) and RAUCH & TRINDADE (2002).

making use of this variable, which reflects the magnitude of the reciprocal value as an additional stylised fact in international trade. Furthermore, this variable can be interpreted as a safeguard against a possible payment default by the importing country due, for instance, to foreign exchange reserves shortages or the eruption of political disturbances, or even to a mutual-induced effect brought about by trade externalities related to "familiarity-promoting effects".

Trading Bloc Dummy Variable

Several dummy variables were also added, regarding static special characteristics that can be of our interest within this dissertation, as already referred in Equation II-9.

The Trading Bloc dummy variable, also known as Natural Trading Bloc following KRUGMAN (1991, pp. 51) nomenclature, might be of interest in our analysis since the total openness of CEEC markets took place in May 2004 with the adoption of the European Union's *acquis communautaire*. Indeed, it might be feasible to consider that not all the benefits of EU membership had been reaped by that date, despite the previous Economic, Association and Cooperation Agreements.

Furthermore, PAAS (2003) introduced a specific sort of trading bloc dummy variable in the model that might also be useful for our purpose, appearing as active when the trade flow occurs between EU15-CEEC. Indeed, in our case, it would be useful to make an analogy to our dissertation, also including trade flows occurring between CC-CEEC. Interestingly, another path to be open within this approach is the specificity of the geographic and economic Austro-German situation in relation to the CEEC markets, which led BEERS & BIESSEN (1996) to introduce the so-called *German dummy variable*[139].

Thus, aiming at the effect of the constitution of Free Trade Areas in bilateral trade, SILVA & TENREYRO (2003, 2004) agreed with FRANKEL's (1997, pp. 52) statement defending the necessity to include an additional openness dummy variable, taking value one if only one of the countries

[139] See also GROS & GONCIARZ (1996).

establishing trading flows belongs to the free-trade arrangement in analysis, therefore capturing the extent of trade between members and non-members of a free-trade arrangement. The sum of the coefficients on the free-trade agreement and the openness dummies would therefore result in the net effect of the free-trade arrangement. However, the use of a FEM equation allows for this openness variables by adding separate dummy variables for each individual country.

Adjacency Dummy Variable

Additionally, the existence of a common border, represented throughout an adjacency dummy variable[140], is taken into account in order to evaluate whether countries having a common border experience a more intensive mutual trade or not. It is positively related to trading flows.

Moreover, several authors have been partisans of testing for possible interactive effects of the common-border variable. Following this path, FRANKEL (1997, pp. 70-71) highlighted the fact that the inclusion of a variable controlling for adjacency tends to get lower coefficients on the distance variable, but, simultaneously, found no significant interactive effect with any other variables[141].

More recently, a quite useful complement of this dummy variable was introduced by CHENG & WALL (2002). These authors defend that not all the borders represent the same effect on trade, since the latter also depends on its length[142].

[140] See as examples FRANKEL & WEI (1995), BEERS & BIESSEN (1996), FRANKEL (1997), PIANI & KUME (2000), BEERS & BERGH (2000), LAMOTTE (2002), CHENG & WALL (2002), EGGER (2002), SILVA & TENREYRO (2003, 2004) and PAAS (2003).
[141] See FRANKEL & ROMER (1996).
[142] In fact, the existence of contiguity between two countries does not seem to be enough to determine the border effect on the enhacing bilateral trade. The size of that contiguity must also assume a preponderant

Landlockedness Dummy Variable

Firstly introduced by FRANKEL (1997, pp. 71), it is related to the supposed negative effect of landlockedness on transportation costs[143].

Finally, it must also be noted that one important thing to take into account when using specifications that include a large number of dummy variables is to stay away from cases of near or perfect multicollinearity. This is avoided by making sure that there is no excessive combined or single overlap between the categories defined by the dummy variables.

Furthermore, the magnitude and the significance of a dummy variable changes depending on which other dummy variables are already included in the model, even when they are completely independant from each other. With dummy variables for categories that never overlap, the significance and the magnitude of the estimation of the coefficient of a particular dummy variable change depending on which other dummy variables are already present.

On the other hand, as categories of higher than average flows are dummied out, the GDP and distance coefficients become smaller, causing the model's base to be lower.

To sum up, the interpretation of the magnitude of the coefficients of each dummy variable must always be made bearing in mind that other dummy variables are also included in the model, and that the magnitudes of the coefficients of the baseline model have been affected by this addition.

position. For instance, the Lithuanian-Polish contiguity (91 km.) cannot obviously represent the same effect as the Lithuanian-Latvian one (453 km.).

[143] This path opened by FRANKEL was only followed by SILVA & TENREYRO (2002).

CHAPTER II – Estimation and Specification Issues

Within this second chapter, we attempt to generate our own gravity model calculations aiming at contributing to the theoretical and empirical discussions concerning the functional form of the gravity model, previously summarised.

For that purpose, we will divide this chapter into three stages. The *first* section will be focused on the results obtained as regards our cross-section calculations, whereas in the *second* section results obtained regarding panel data will be tackled.

Finally, we will predict estimated bilateral trading values, considered as potential trade flows, and based on the gravity equations defined in the previous section, aiming at comparing these figures with their currently observed flows. This procedure will allow obtaining remarkable predictable conclusions on the evolution of the bilateral trading flows for a few years to come.

II.2.1 Estimation Results on Cross-Section Data

In the construction of our empirical cross-section models, we consider a sample of twenty-five countries and their bilateral trade relations. Our data consists of a four series cross-section data of 600 trading pairs for each year, ranging from 1999 to 2002 and involving all the EU25 members. It must be noted that none of them represented problematic zero-trade flows. Data sources are presented in the appendix.

OLS concerning Exporting Bilateral Flows

Firstly, we will adopt the exporting bilateral flows as our dependant variable in the model. Note that we treat each year as an independant regression when referring to cross-section analysis. However, this has not been the case for all the authors working on several-years cross-section gravity models. On the contrary, we could state that a great number of authors often proceed to calculate

the all-years-average regression[144], transforming, therefore, a panel data into a cross-section model.

Nevertheless, although this procedure is usually presented as an alternative to estimate log-run coefficients, it is econometrically wrong. Indeed, when average values are considered for each variable, it is quite likely that strict endogeneity between a given regressor and the respective dependant variable exists, since the latter includes several years. We infer, from this behaviour, that the authors consider this error as having little significance, given a weak correlation between both variables. However, there is still a bias and, consequently, we will not include the average-values calculation into this dissertation[145].

After this important note, we would now turn to our empirical calculations. The table below displays the OLS results obtained for each one of the four years considered.

Table II-1 – Significant Cross-Section Gravity Models as regards to Exporting flows (years 1999 to 2002)

Variable (LX)	1999	2000	2001	2002
R-Squared	**0.922797**	**0.916816**	**0.920007**	**0.925318**
Constant	s.i. (-0.345184)	s.i. (-0.559062)	-2.77696** (-2.48027)	-2.69249*** (-2.60622)
LDIST	-0.748554*** (-9.89176)	-0.751048*** (-9.84002)	-0.723627*** (-9.36014)	-0.722823*** (-9.9515)
LMGDP	0.179202*** (4.35006)	0.197929*** (4.43859)	0.26608*** (5.19266)	0.218338*** (4.17294)
LXGDP	0.464456*** (14.2744)	0.452157*** (13.8277)	0.514888*** (10.1276)	0.555052*** (11.0328)
LMPOP	0.327772*** (5.983)	0.280841*** (5.2519)	0.191519*** (3.96814)	0.225897*** (4.76444)
LXPOP	-0.271946*** (-5.02866)	-0.252059*** (-4.59899)	-0.22765*** (-4.46648)	-0.241064*** (-4.87336)
ETHN	0.293853* (1.78112)	s.i. (1.47125)	s.i. (1.47159)	s.i. (0.903497)
LEIS	1.17193*** (7.29663)	1.05907*** (6.19565)	0.758137*** (3.87556)	0.646727** (3.73455)
EU15	0.187912** (1.98581)	0.166057* (1.70693)	s.i. (0.417620)	s.i. (0.023665)
LMLAND	-0.10839** (-2.48557)	-0.091616** (-2.15063)	s.i. (-1.23373)	s.i. (-1.23173)

[144] See as examples GROSS & GONCIARZ (1996), BOUGHEAS *et al.* (1999), SOLOAGA & WINTERS (1999), GARCÍA-MENENDEZ *et al.* (2000), EGGER (2000), HARRIS & MÁTYÁS (2001) and MARTÍNEZ-ZARZOSO & NOWAK-LEHMANN (2001).

[145] Nevertheless, calculations were made using this method and the results did not differ much with the independant four-year cross-section regressions. These results are available under requirement.

(cont.)

Table II-1 – Significant Cross-Section Gravity Models as regards to Exporting flows (years 1999 to 2002) (cont.)

Variable (LX)	1999	2000	2001	2002
LXLAND	0.171711***	0.148266***	0.115729***	0.076904**
	(4.76126)	(4.21561)	(3.49906)	(2.37226)
LEXR	s.i.	s.i.	s.i.	0.01899*
	(0.917814)	(0.926834)	(1.13282)	(1.88317)
LMFER	0.076359***	0.088607***	0.046094*	0.044682**
	(3.05624)	(3.02811)	(1.83684)	(2.29257)
EURO	0.283643***	0.293624***	0.320033***	0.283975***
	(3.21354)	(3.31036)	(3.89878)	(3.65376)
LRECI	0.411451***	0.410003***	0.423280***	0.439316***
	(9.59329)	(9.67887)	(8.92529)	(9.57629)
MLOCK	-0.336925***	-0.317121***	-0.296837***	-0.243651***
	(-4.48752)	(-4.18504)	(-4.18405)	(-3.64138)
XLOCK	s.i.	s.i.	-0.14728*	s.i.
	(0.572675)	(0.879948)	(-1.79097)	(1.09763)
RESET Test	**0.00002**	**0.00021**	**0.00008**	**0.00036**
(p-value)				

Source: Own calculations following OLS and making use of TSP 4.5.
Variable Definitions: See Annex III.1.1.
Dependant Variable is the natural logarithm of Exports from country i to country j.
The t-statistics are found in brackets. Standard Errors are heteroskedastic-consistent (HCTYPE=2). The estimations use WHITE (1980)'s heteroskedasticity-consistent covariance matrix estimator.
*** = 99%. ** = 95%. * = 90%. s.i. = statistically insignificant for α higher than 10%. n = 600.

As it can be observed, the R-squared is extremely significant, all the coefficients present the expected sign and their magnitude is similar to that found in other studies with the exception of the coefficients of the exporter and importer income variables. Indeed, we observe that the latter present a lower-than-usual magnitude, as a value close to one has been usually obtained when making use of this methodology[146]. These findings suggest, according to SILVA & TENREYRO (2004, pp. 24), that "*the simpler models of gravity equation (those that predict unit-income elasticities typically as a result of specialization in production and homothetic preferences) should be modified to feature a less-than-proportional relationship between trade and GDP*". It is worth pointing out that unit-income elasticities in the simple gravity framework are at odds with the observation that the trade-to-GDP ratio decreases with total GDP or, in other words, that smaller countries tend to be more open to international trade.

[146] These findings also follow ANDERSON & WINCOOP (2003). This same conclusion will be expectedly revealed later on, making use of Poisson estimates. See SILVA & TENREYRO (2003, pp. 18).

Specially important are the conclusions that exporting flows within the EU25 significantly increase with *trade-pattern similarity* (LEIS), *exporter income* (LXGDP), *trade flow reciprocity* (LRECI), *insertion in the Eurozone* (EURO), *importer population* (LMPOP), *insertion in the EU15* (although not always significant - EU15), *importer income* (LMGDP) and *exporter land size* (LXLAND). On the other hand, exporting flows within the EU25 decrease with *absolute distance* (LDIST), *importer landlockedness* (not always significant - MLOCK), *exporter population* (LXPOP), and *importer land size* (not always significant - LMLAND). Note that these enumerations follow a decreasing order of importance.

As remarkable points, it must be firstly highlighted that the measure of import-export similarity, previously calculated in Chapter II is extremely and positively significant. Secondly, trade flow reciprocity is also quite significant, a situation that can be interpreted as a sign of concern about a possible payment default, as well as a sign of mutual-induced interest in manufactures.

Thirdly, exporter income (interpreted as country's ability to produce high-quality and technologically advanced manufactures) and importer population (interpreted as potential market) appear as promoters of exporting flows. On the other side, exporter population (interpreted as decreasing country's dependence on trade due to its huge internal market) and absolute distance come into view as strong impediments to exports.

Interestingly, the sign of both the importer (positive) and exporter (negative) population obtained above can be interpreted, according to BERGSTRAND (1989), as the fact that EU25 trading flows involving imports tend to be necessity goods, while exports tend to be capital intensive.

Finally, effects such as the insertion in Eurozone, in the EU15 or importer landlockedness are also significant, implying important conclusions in terms of fixed, or at least stable, country-specificities.

Note that some of the variables considered appear as significant in an erratic and marginal way, namely the existence of a *relevant ethnic minority* in the trading partner (ETHN), *insertion in the EU15* (EU15), *importer land size*

(LMLAND), *exchange rate* (LEXR), *importer's stock of foreign exchange reserves* (LMFER) and *exporter landlockedness* (XLOCK). Note also that other independant variables were also tested, more specifically the following: *adjacency* (NEIGH), *common language* (IDIOM), *commodities composition of trade measured accordingly to COSthe -measure as alternatively defined to the LEIS-measure* (LCOS), *relative distance relating to the European trade economic centre* (LRDIST), *inequality in terms of per capita income* (LINEQ), *exporter's stock of foreign exchange reserves* (LXFER) and the *importer's German bias* (GERMAN). However, it was concluded that they were statistically insignificant for all considered years.

Indeed, the NEIGH, IDIOM, LINEQ, LXFER and GERMAN variables seem to be highly insignificant due either to their own irrelevancy or given other independant variables' effects on the regression. The degree of statistically insignificance of the LRDIST and LCOS variable deserve special attention.

First of all, the COS-measure seems to have lost the battle against the EIS-measure, in our case study, mostly due to intrinsic characteristics (see Section I.2.2). Indeed, LCOS variable is highly significant, in the above regression, when LEIS is not considered, but its level of significance is no longer observed when LEIS is introduced in the model.

Secondly, as regards to the LRDIST variable, we followed SMARZYNSKA JAVORCIK's (2001, Appendix I) methodology, given the author's interesting values inferred. Unfortunately, the variable referring to the analogous calculated distance to the European Trade Economic Centre[147] in this dissertation presents statistically insignificant results.

In fact, this effect would be expected to be highly significant (as it would be) when the whole world is taken into account, as several authors proved[148]. Within this scope, we could focus our attention on the New Zealand-Australia case as a clear example of the importance assumed by this variable. Indeed, these

[147] This is calculated as the sum of all arithmetic average of the Cartesian coordinates of the two capitals considered relevant for manufacturing exchanges between a particular pair of countries and weighted by partners' GDPs.
[148] See for instance POLAK (1996), FRANKEL (1997) or PIANI & KUME (2000).

two countries would overtrade with each other as a consequence of being so far away from the world trade economic centre.

Notwithstanding, the statistical significance of this approach seems to melt away when only the EU25 is considered, due to the fact that the relative distances are much smaller. However, it may be also interesting to refer that the exact location of the European trade economic centre for these four years (from 1999 to 2002) and its implicit evolution.

The European trade economic centre was found to be located on the *Ostbayern* (Bavarian Forest, Germany), quite near the Czech and the Austrian borders[149]. Throughout the four years considered, it suffered a slight pull to the Southeast[150], showing the increasing importance of CEEC's GDPs.

Finally, it must be mentioned that the RESET tests carried out for each one of the years lead us to the conclusion that there still are some misspecifications or missing variables in the model.

OLS concerning Importing Bilateral Flows

We will henceforth adopt the importing bilateral flows as our dependant variable in the model. The table below displays the OLS results obtained for each one of the four years considered.

Table II-2 – Significant Cross-Section Gravity Models as regards to Importing flows (years 1999 to 2002)

Variable (LM)	1999	2000	2001	2002
R-Squared	**0.928725**	**0.920948**	**0.920731**	**0.920002**
LDIST	-0.685234***	-0.659361***	-0.655386***	-0.730997***
	(-9.53634)	(-8.87110)	(-8.67207)	(-9.30302)
LMGDP	s.i.	s.i.	0.109072**	0.143490***
	(1.48814)	(1.41009)	(1.97889)	(2.87599)
LXGDP	0.466201***	0.459829***	0.499307***	0.523419***
	(14.2787)	(12.2746)	(15.0545)	(14.4449)
LMPOP	0.359416***	0.299456***	0.251786***	0.284790***
	(8.796)	(6.09163)	(5.17476)	(5.63179)
LXPOP	-0.271398***	-0.221123***	-0.181331***	-0.186663***
	(-4.59889)	(-3.60454)	(-3.85902)	(-4.18803)
LEIS	1.00585***	0.861705***	1.04979***	1.15023***
	(7.19216)	(5.84926)	(6.97141)	(7.95226)

(cont.)

[149] In 1999, it was located exactly on the following coordinates, 48º: 55 m: 26 s N; 13º: 25 m: 48 s E.
[150] In 2002, it was located exactly on the following coordinates, 48º: 51 m: 35 s N; 13º: 28 m: 6 s E.

Table II-2 – Significant Cross-Section Gravity Models as regards to Importing flows (years 1999 to 2002) (cont.)

Variable (LM)	1999	2000	2001	2002
EU15	0.362983***	0.318478***	s.i.	s.i.
	(3.16416)	(3.10621)	(1.46900)	(1.08108)
LINEQ	0.046107**	0.042814*	s.i.	s.i.
	(2.06267)	(1.76384)	(-0.59691)	(0.098801)
LXLAND	0.136096***	0.097979**	s.i.	s.i.
	(3.74074)	(2.53232)	(0.147528)	(-0.032555)
LEXR	0.028467***	0.030768***	0.033013***	0.034746***
	(2.79241)	(2.82650)	(2.84218)	(3.10988)
LMFER	0.050258**	0.072073**	s.i.	s.i.
	(2.11701)	(2.52524)	(1.27287)	(1.09797)
EURO	0.253909***	0.256098***	0.323663***	0.341600***
	(2.83250)	(3.12991)	(4.44184)	(4.78419)
LRECI	0.504274***	0.522115***	0.502367***	0.445426***
	(15.0459)	(14.5729)	(10.8524)	(9.52192)
MLOCK	-0.37996***	-0.360561***	-0.471885***	-0.439388***
	(-5.06293)	(-4.68144)	(-6.36489)	(-6.11188)
XLOCK	0.227661***	0.255548***	0.258973***	0.170003**
	(3.27771)	(3.64573)	(3.68952)	(2.56628)
RESET Test (p-value)	**0.00000**	**0.00006**	**0.00749**	**0.00418**

Source: Own calculations following OLS and making use of TSP 4.5.
Variable Definitions: See Annex III.1.1.
Dependant Variable is the natural logarithm of Imports from country i to country j.
The t-statistics are found in brackets. Standard Errors are heteroskedastic-consistent (HCTYPE=2). The estimations use WHITE (1980)'s heteroskedasticity-consistent covariance matrix estimator.
*** = 99%. ** = 95%. * = 90%. s.i. = statistically insignificant for α higher than 10%. n = 600.

As it can be observed, the R-squared is also extremely significant, all the coefficients present the expected sign and their magnitude is similar to that found in other studies with the exception of the coefficients of the exporter and importer income variables. Indeed, we observe that both the latter present a lower-than-usual magnitude, as a value close to one has been usually obtained when making use of this methodology. Moreover, importer income is not always statistically significant.

Specially important are the conclusions that importing flows within the EU25 significantly increase with *trade-pattern similarity* (LEIS), *trade flow reciprocity* (LRECI), *exporter income* (LXGDP), *importer population* (LMPOP), *insertion in the Eurozone* (EURO), *exporter landlockedness* (MLOCK), *insertion in the EU15* (although not always significant - EU15), *exporter land size* (not always significant - LXLAND) and *importer income* (not always significant - LMGDP). On the other hand, importing flows within the EU25 decrease with *absolute distance* (LDIST), *importer landlockedness* (MLOCK) and *exporter*

population (LXPOP). Note that these enumerations follow a decreasing order of importance.

As remarkable points, it must be highlighted that the measure of import-export similarity previously calculated in Chapter II (LEIS) is extremely and positively significant when referring to importing flows, as was the case of the exporting flows. Secondly, trade flow reciprocity is also considered to be quite significant. Additionally, both exporter income (LXGDP - interpreted as exporter's ability to produce high-quality and technologically advanced manufactures) and importer population (LMPOP - interpreted as potential market) appear as responsible for promoting importing flows, while exporter population (interpreted as decreasing country's dependence on trade due to its internal market size) and absolute distance come into view as strong impediments to imports.

Finally, effects such as insertion in the Eurozone (EURO), in the EU15 or importer and exporter landlockedness (MLOCK and XLOCK respectively) are also significant, resulting in important conclusions concerning fixed, or at least stable, country-specificities on import flows.

A constant and other independant variables were also tested, namely NEIGH, IDIOM, ETHN, LCOS, LMLAND, LRDIST, GERMAN and LXFER. However, they were concluded to be statistically insignificant for all the considered years. The notes made as regards to these same variables' insignificance on exporting flows are maintained when referring to importing trade flows.

Finally, the results obtained for the above gravity equations allow us to conclude that the parameters for each one of the different trading flows are comparatively stable, and consequently, the results of analysis of trade scenarios do not remarkably depend on the year of data used for estimated gravity equations. However, it must also be borne in mind that the RESET tests carried out for each one of the years lead us to the conclusion that there still are some misspecifications or missing variables in the model.

PML concerning Exporting Bilateral Flows

Given the above mentioned problems, and despite the excellent results obtained, another step forward must be taken taking into consideration the conclusions obtained by SILVA & TENREYRO (2003, 2004)[151]. Indeed, these authors interestingly based their conclusions on the biases caused by the presence of heteroskedasticity on estimating economic relationships in logarithms.

Therefore, we will now pay attention to methods of avoiding this bias by calculating a Poisson pseudo-maximum likelihood estimator (PML), a recent alternative to the loglinear model.

Table II-3 – Significant Poisson Pseudo-Maximum Likelihood Estimator Model making use of Cross Section as regards to Exporting flows (years 1999 to 2002)

Dependant Var. X	**1999**	**2000**	**2001**	**2002**
R-Squared	**0.933143**	**0.932791**	**0.927846**	**0.916760**
Constant	-1.14263 (-0.730103)	-0.600027 (-0.385852)	-1.25391 (-0.761103)	-1.98202 (-1.36365)
LDIST	-0.358120*** (-4.71020)	-0.369871*** (-4.84772)	-0.394888*** (-4.94702)	-0.432921*** (-5.32502)
LMGDP	0.191826*** (3.06391)	0.210805*** (5.56103)	0.220108*** (3.55311)	0.229370*** (3.45558)
LXGDP	0.424648*** (5.19538)	0.378649*** (5.35635)	0.399351*** (5.60782)	0.439002*** (6.34261)
LMPOP	0.162115*** (3.87329)	0.187793*** (4.24784)	0.171752*** (3.38323)	0.128501** (2.20493)
LXPOP	-0.173644*** (-2.95749)	s.i. (-0.983382)	s.i. (-0.611405)	s.i. (-0.859740)
IDIOM	0.227716** (2.00968)	0.218792* (1.93652)	0.221648* (1.79040)	s.i. (1.38670)
ETHN	s.i. (0.786858)	0.229698* (1.72982)	0.243453* (1.86877)	0.335210** (2.30730)
LEIS	0.932887*** (3.38052)	0.806702*** (2.86839)	0.668522** (2.19757)	0.474235* (1.72728)
LRDIST	0.093925* (1.61430)	0.133643** (2.09546)	0.109553* (1.72865)	0.118525* (1.85390)
LXLAND	s.i. (-1.39278)	-0.097756*** (-2.60072)	-0.117586*** (-3.25721)	-0.131718*** (-3.62443)
LINEQ	s.i. (-1.17312)	-0.044542* (-1.70978)	s.i. (-0.721611)	s.i. (-1.42960)
LEXR	0.040178*** (2.66534)	0.035039*** (2.64049)	0.035180** (2.55374)	0.038229*** (2.96853)
EURO	0.224763*** (2.87305)	0.256507*** (3.34351)	0.288704*** (3.51357)	0.311414*** (3.57355)
LRECI	0.444933*** (7.40298)	0.402218*** (6.97332)	0.418117*** (6.60343)	0.443504*** (6.21333)
GERMAN	0.198924*** (2.91194)	0.196915*** (3.09934)	0.226284*** (3.22600)	0.206780*** (3.01290)

[151] See Section II.1.3.

(cont.)

Table II-3 – Significant Poisson Pseudo-Maximum Likelihood Estimator Model making use of Cross Section as regards to Exporting flows (years 1999 to 2002) (cont.)

Dependant Var. X	1999	2000	2001	2002
XLOCK	-0.270079** (-2.28025)	-0.231565* (-1.88683)	-0.207815* (-1.72893)	s.i. (-1.55701)
RESET test (p-value)	**0.00186**	**0.39099**	**0.12051**	**0.00592**

Source: Own calculations following POISSON-command and making use of TSP 4.5.
Variable Definitions: See Annex III.1.1.
Dependant Variable is the rounded absolute value of Exports from country i to country j.
The t-statistics are found in brackets. Standard Errors are computed from analytic first and second derivatives (Eicker-White). Note that the presence of a constant is inherent to the model.

Taking into consideration the exporting flows as the regression's dependant variable, the concluding remarks regarding the PML estimator are firstly focused on the slightly higher R-squared figures when compared to the OLS estimator. However, there are other interesting conclusions as regards to the coefficients presented by each independant variable in the regression.

In this respect, the lower coefficients obtained by LDIST, LMPOP, LXLAND must be highlighted and, in a minor extent, also LEIS variable as regards to the PML estimator. The fact that income elasticities are significantly smaller than one is an interesting observation as well. Thus, it can be concluded that standard OLS estimators greatly exaggerate the roles of income, distance, importing population and exporting land area.

Note that the above conclusions are also supported by SILVA & TENREYRO's (2003, 2004) findings related to worldwide international trade. Indeed, the bias that this new methodology is trying to avoid "*tends to be, on one hand, positive for the coefficients on variables that relate to larger volumes of trade and, presumably, to larger variance and, on the other hand, negative for variables that discourage trade and, possibly, reduce the variance*" (SILVA & TENREYRO (2003, pp. 21)).

Moreover, the independant variables LMFER and LXPOP turn out to be statistically insignificant. Simultaneously, LRDIST, GERMAN, ETHN and IDIOM effects appear, for the first time, as regular statistically significant, a situation that would be, at first sight, economically expectable.

Finally, the main difference between the OLS and the PML estimators is related to the RESET test. In this respect, this test shows a more statistically significant specification of the latter. However, the results obtained are not acceptable. The reason for these low results in absolute terms is likely to be the existence of omitted variables in the model.

PML concerning Importing Bilateral Flows

Taking now into consideration the importing flows as the regression's dependant variable, the concluding remarks regarding the PML estimator are also focused on the slightly higher R-squared figures when compared to the OLS estimator. In this respect, the R-squared hereby obtained turns out to be the highest of all the considered models.

Table II-4 – Significant Poisson Pseudo-Maximum Likelihood Estimator Model making use of Cross-Section Data as regards to Importing flows (years 1999 to 2002)

Dependant Var. M	**1999**	**2000**	**2001**	**2002**
R-Squared	**0.953605**	**0.953784**	**0.951159**	**0.941000**
Constant	2.28900*	0.085361	-1.61643	-2.23728*
	(1.82233)	(0.072930)	(-1.17336)	(-1.60710)
LDIST	-0.303274***	-0.282429***	-0.235901***	-0.253076***
	(-4.29787)	(-4.38838)	(-2.91122)	(-2.92824)
LMGDP	s.i.	0.105772***	0.165483***	0.188360***
	(-0.323709)	(1.91212)	(2.70908)	(3.17206)
LXGDP	0.257008***	0.362646***	0.383561***	0.430971***
	(4.55134)	(5.55010)	(5.83993)	(6.76700)
LMPOP	0.317741***	0.193156***	0.191519***	0.169708***
	(7.75451)	(4.39733)	(3.96814)	(3.57562)
LXPOP	s.i.	-0.120607**	s.i.	s.i.
	(-1.20006)	(-2.05344)	(-0.813283)	(-0.388052)
NEIGH	s.i.	s.i.	0.127511*	0.139484*
	(1.48906)	(1.23788)	(1.79727)	(1.70321)
IDIOM	0.181864**	s.i.	0.183958*	0.198211*
	(2.03076)	(1.26552)	(1.69877)	(1.70534)
ETHN	s.i.	0.253218*	0.267051*	0.278931*
	(1.13604)	(1.71312)	(1.86424)	(1.88173)
LEIS	1.01329***	0.899162***	0.740533***	0.648568**
	(3.63894)	(3.66296)	(2.82755)	(2.39573)
LRDIST	0.099325**	0.133982***	0.133833***	0.143097***
	(2.08625)	(2.75286)	(2.79245)	(2.91852)
EU15	0.290326***	s.i.	s.i.	s.i.
	(3.10374)	(0.507722)	(1.05228)	(0.453314)
LXLAND	-0.070529*	-0.092915**	-0.178464***	-0.201452***
	(-1.84633)	(-2.51087)	(-5.75805)	(-6.18663)

(cont.)

Table II-4 – Significant Poisson Pseudo-Maximum Likelihood Estimator Model making use of Cross-Section Data as regards to Importing flows (years 1999 to 2002) (cont.)

Dependant Var. M	1999	2000	2001	2002
LINEQ	s.i. (-0.789112)	-0.040689* (-1.71752)	s.i. (-0.822449)	s.i. (-0.894574)
LEXR	0.031407** (2.42916)	0.026756** (2.07934)	0.026702** (2.11903)	0.031858** (2.58045)
LXFER	-0.052100* (-1.74006)	s.i. (-0.424345)	s.i. (0.625654)	s.i. (0.850918)
EURO	0.141336* (1.96817)	0.203235*** (3.00520)	0.199448** (2.58643)	0.206041** (2.45213)
LRECI	0.524466*** (10.9904)	0.552193*** (9.95283)	0.498771*** (8.25375)	0.472542*** (7.81482)
GERMAN	0.202548*** (3.20915)	0.130697** (2.26687)	0.159178*** (2.65088)	0.171915*** (2.88140)
XLOCK	-0.169433* (-1.99989)	s.i. (-1.79933)	s.i. (-1.35691)	s.i. (-1.12686)
RESET test (p-value)	**0.89463**	**0.99125**	**0.81537**	**0.99264**

Source: Own calculations following POISSON-command and making use of TSP 4.5.
Variable Definitions: See Annex III.1.1.
Dependant Variable is the rounded absolute value of Imports from country i to country j.
The t-statistics are found in brackets. Standard Errors are computed from analytic first and second derivatives (Eicker-White). Note that the presence of a constant is inherent to the model.
*** = 99%. ** = 95%. * = 90%. s.i. = statistically insignificant for α higher than 10%. n = 600.

There are also other interesting conclusions as regards to the coefficients presented by each independant variable in the regression, similar to be remarkable findings previously reached regarding the exporting flows. Once again, the lower coefficients obtained by LDIST, LMPOP, LXLAND, EURO and, in a minor extent, by the LEIS variable as regards to the PML estimator must be highlighted. Moreover, the independant variables LMFER and LXPOP turn out to be statistically insignificant. Simultaneously, LRDIST, GERMAN, NEIGH, ETHN and IDIOM effects appear, for the first time, as regularly statistically significant, a situation that would be at first sight economically expectable.

Finally, the results obtained regarding the RESET test may be qualified as impressive, as they are even higher than those findings obtained regarding the exporting flows. Therefore, it may be statistically concluded that this model does not present any problems of misspecification or any missing variables. Consequently, we are led to be partisans of the PML estimator superiority, when compared to the OLS results.

To sum up, the Poisson pseudo-Maximum Likelihood estimator (PML) is concluded to be a better alternative to the OLS method as regards to cross-section data, according to previous works by SILVA & TENREYRO (2003, 2004). This conclusion is more obvious due to the excellent empirical results obtained in terms of the RESET robustness test when compared to the previous model.

II.2.2 Estimation Results on Pooled Data

In the construction of our empirical pooled data model, we consider a sample of twenty-five countries and their bilateral trade relations. Our data consists, therefore, of a balanced pooled data of 600 trading pairs for each year (none of them representing problematic zero-trade flows and summing up to 2 400 observations). Data sources are given in the appendix.

OLS Pooling Cross-Section Data Across Time

We will pool the previous cross-section data across time. Within this approach, the table below displays the OLS results obtained for each one of the two possible trading flows.

Table II-5 – Significant Pooled Cross Section Across Time Gravity Models as regards to Importing and Exporting flows (years 1999 to 2002)

Variable	LX	LM
R-Squared	**0.921538**	**0.923194**
Constant	-2.40499***	-1.56624**
	(-3.95096)	(-2.13209)
LDIST	-0.674072***	-0.681335***
	(-15.6674)	(-15.5256)
LMGDP	0.225106***	0.135137***
	(8.06371)	(4.07439)
LXGDP	0.543218***	0.538806***
	(19.5967)	(15.5579)
LMPOP	0.249456***	0.231366***
	(8.89700)	(7.86318)
LXPOP	-0.286348***	-0.226808***
	(-11.1461)	(-7.20945)
NEIGH	0.111018**	0.082306*
	(2.22399)	(1.67878)
ETHN	0.209757***	0.244491**
	(2.64933)	(2.58070)

(cont.)

Table II-5 – Significant Pooled Cross Section Across Time Gravity Models as regards to Importing and Exporting flows (years 1999 to 2002) (cont.)

Variable	LX	LM
LEIS	0.824530***	0.920460***
	(7.90561)	(8.62063)
LXLAND	0.133476***	0.066258***
	(7.78646)	(3.68759)
LMLAND	-0.075336***	s.i.
	(-3.44312)	(-0.378587)
LINEQ	s.i.	0.024553**
	(0.521757)	(1.99990)
LEXR	0.013691**	0.030866***
	(2.51988)	(5.22903)
LMFER	0.069847***	0.049805***
	(5.59454)	(4.05073)
EURO	0.300349***	0.268762***
	(7.36858)	(5.93728)
LRECI	0.424386***	0.461798***
	(18.5307)	(19.8471)
GERMAN	0.096079**	0.079317**
	(2.39705)	(2.08787)
MLOCK	-0.291601***	-0.384710***
	(-7.94882)	(-10.2141)
XLOCK	0.084707**	0.242840***
	(2.14329)	(6.35368)
RESET test	**0.00000**	**0.00000**
(p-value)		

Source: Own calculations following OLS and making use of TSP 4.5.
Variable Definitions: See Annex III.1.1.
Dependant Variable is the natural logarithm of either Exports or Imports from country i to country j.
The t-statistics are found in brackets. Standard Errors are heteroskedastic-consistent (HCTYPE=2). The estimations use WHITE (1980)'s heteroskedasticity-consistent covariance matrix estimator.
*** = 99%. ** = 95%. * = 90%. s.i. = statistically insignificant for α higher than 10%. n = 2 400.

As it can be observed, R-squared are extremely significant, all the coefficients present the expected sign and their magnitude is similar to that found in other studies, with the exception, once again, of the coefficients of the exporter and importer income variables. Indeed, we observe that the latter present a lower-than-usual magnitude. A value close to one was usually obtained when making use of this pooled data methodology. It should also be mentioned that the previous conclusions and magnitudes obtained is the cross-section are maintained when related to pooled data.

As regards to the exporting flows within the EU25, specially important are the figures showing that they significantly increase with *trade-pattern similarity* (LEIS) in almost 128%[152], *exporter income* (LXGDP) in 72%[153], *trade flow*

[152] As the respective coefficient equals 0.82453, the final effect is 128.08%, since $e^{0.82453}$–1 equals 1.2808. It means that the exporting flow between two countries presenting a trade-pattern similarity equivalent to

reciprocity (LRECI) in 53%, *insertion in the Eurozone* (EURO) in 35%, *importer population* (LMPOP) in 28%, *importer income* (LMGDP) in 25%, *ethnicity* (ETHN) in 23% and, involving less relevant magnitudes, *exporter land size* (LXLAND), *neighbouring* (NEIGH), *German-dummy* (GERMAN), *exporter landlockedness* (XLOCK), *importer foreign exchange reserves* (LMFER) and *bilateral average exchange rate* (LEXR). On the other hand, exporting flows within the EU25 decrease with *absolute distance* (LDIST) in 96%[154], *importer landlockedness* (MLOCK) in 34% and *exporter population* (LXPOP) in 33%. Note that these enumerations follow a decreasing order of importance.

Other independant variables were also tested, namely IDIOM, LCOS, LINEQ, EU15, LRDIST and LXFER. However, they were concluded to be statistically insignificant. The notes made as regards to these same variables' insignificance on cross-section regressions are also maintained here.

On the opposite flow, equally remarkable are the figures showing that importing flows within the EU25 significantly increase with *trade-pattern similarity* (LEIS) in almost 151%, *exporter income* (LXGDP) in 71%, *trade flow reciprocity* (LRECI) in 59%, *insertion in the Eurozone* (EURO) in 31%, *ethnicity* (ETHN) in 28%, *exporter landlockedness* (MLOCK) in 27%, *importer population* (LMPOP) in 26% and, involving less relevant magnitudes, *importer income* (LMGDP), *neighbouring* (NEIGH), *German-dummy* (GERMAN), *exporter land size* (LXLAND), *importer foreign exchange reserves* (LMFER), *bilateral average exchange rate* (LEXR) and *income inequality* (LINEQ). On the other hand, importing flows within the EU25 decrease with *absolute distance* (LDIST) in 98%, *exporter landlockedness* (XLOCK) in 47% and *exporter*

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one (perfect match then) would be 128.08% higher than the same flow between two countries presenting a trade-pattern similarity equivalent to zero, *ceteris paribus*.

[153] In the same sense, as the respective coefficient equals 0.543218, the final effect is 72.15%, since $e^{0.543218}$–1 equals 0.7215. It means that the trade flow fulfilled by one exporter country increasing its income in one thousand euros will be expected to increase by € 721.54, *ceteris paribus* (and so on for the rest of effects).

[154] As the respective coefficient equals -0.674072, the final effect is -96.22% then, since $e^{-0.674072}$–1 equals -0.674072. It means that the exporting flow between two countries presenting an absolute distance between their respective capitals of two thousand kilometers would be € 962.21 smaller than the same flow between two countries presenting an absolute distance of one thousand, *ceteris paribus* (and so on for the rest of effects).

population (LXPOP) in 25%. Note once again that these enumerations also follow a decreasing order of importance.

IDIOM, LCOS, LMLAND, EU15, LRDIST and LXFER are other independent variables that were also tested and were concluded to be statistically insignificant.

Therefore, most of the conclusions already highlighted as regards to the cross-section regressions are maintained with the panel data, including those involving some variables' insignificance. The higher significance assumed by exporter and importer landlockedness and also by trade-pattern similarity, when regarding to imports relatively to exporting flows, deserve particular importance.

Nevertheless, the figures obtained as regards to the RESET test must also be taken into account. As it happened in the case of cross-section data, this test clearly indicates that the above regression presents some problems both in terms of misspecification and missing variables. Consequently, we are led to find an alternative path in which both the specification and the included variables related to this indicator are considered to be properly defined.

In this respect, we were tempted to follow this *pooled-format* methodology by including as many dummy variables as the number of possible pairs of countries. However, this solution, just by itself, would bring about a huge loss of degrees of freedom, as we would have to include 600 dummy variables in the model.

First-Differenced Model

An additional possibility, still following the *pooled-data format* approach, would be the construction of another alternative method shaped in the form of a first-differences model, as already referred in **Error! Reference source not found.**. In this respect, it must once again be highlighted, as it also happened as regards to the FEM estimator, that we are not explicitly considering estimations of standard cross-sectional relationships, but how changes over time in the explanatory variables affect the dependant variable, over the same time period.

Thus, this methodology, although economically interesting, cannot be used as an alternative option to the regressions presented hitherto.

The table below displays the OLS results obtained for each one of the two possible trading flows following a first differenced model.

Table II-6 – Significant First-Differenced Model making use of Pooled Data as regards to Importing and Exporting flows (years 1999 to 2002)

Variable	LX	LM
R-Squared	**0.082289**	**0,068109**
LMGDP	0.641712*** (6.08754)	0.725367*** (6.86375)
LXGDP	1.13243*** (8.76072)	1.00137*** (7.78870)
LEIS	0.371215* (1.65535)	s.i. (0.135118)
LRECI	0.066414** (2.12835)	0.108148*** (3.51014)
RESET test (p-value)	**0.10265**	**0.97637**

Source: Own calculations following OLS and making use of TSP 4.5.
Variable Definitions: See Annex III.1.1.
Dependant Variable is the natural logarithm of either Exports or Imports from country i to country j.
The t-statistics are found in brackets. Standard Errors are heteroskedastic-consistent (HCTYPE=2). The estimations use WHITE (1980)'s heteroskedasticity-consistent covariance matrix estimator.
*** = 99%. ** = 95%. * = 90%. s.i. = statistically insignificant for α higher than 10%. n = 1 800.

As it can be observed as regards to the R-squared values, making use of this methodology brings about poor results in both exporting and importing regressions, despite not presenting statistically significant errors in terms of misspecification. Indeed, the explanatory power barely achieves 0.082289 and 0.068109, respectively.

Note that ΔLMFER, ΔLMPOP, ΔLINEQ, ΔLXPOP, ΔLRDIST, ΔLXFER and ΔLEXR are statistically insignificant, whereas the fixed-effects LDIST, NEIGH, IDIOM, ETHN, EU15, LMLAND, LXLAND, EURO, GERMAN, MLOCK and XLOCK are, as expected, intrinsically vanished from the regression. Consequently, only *importer and exporter incomes* and *trade flow reciprocity* are statistically significant, as regards to the importing year-differentials. In addition, *trade-pattern similarity* also appears as significant as regards to the exporting year-differentials.

Poisson Pseudo-Maximum Likelihood Estimator

We will affect the Poisson Pseudo-Maximum Likelihood estimator to the pooled data at our disposal throughout this dissertation, already applied as regards to cross-section data.

Table II-7 – Significant Poisson Pseudo-Maximum Likelihood Estimator Model making use of Pooled Data as regards to Importing and Exporting flows (years 1999 to 2002)

Dependant Var.	**X**	**M**
R-Squared	**0.930649**	**0.950632**
Constant	-2.11686***	-0.989740*
	(-2.62049)	(-1.65933)
LDIST	-0.328622***	-0.242132***
	(-6.87450)	(-5.94711)
LMGDP	0.214160***	0.140293***
	(6.80234)	(4.60686)
LXGDP	0.454296***	0.397795***
	(10.7016)	(10.8396)
LMPOP	0.136569***	0.188176***
	(5.19311)	(8.43924)
LXPOP	-0.064016*	-0.085168**
	(-1.55973)	(-2.40943)
NEIGH	0.116907**	0.116101***
	(2.52238)	(3.07725)
IDIOM	0.212801***	0.185733***
	(2.63659)	(3.66418)
ETHN	0.192278***	0.205659**
	(2.76056)	(2.56012)
LEIS	0.627746***	0.815895***
	(4.52873)	(6.65273)

(cont.)

Error! Reference source not found. **(cont.)**

Dependant Var.	**X**	**M**
LRDIST	0.102152***	0.118905***
	(3.30676)	(4.97076)
LXLAND	-0.106457***	-0.138192***
	(-4.51704)	(-6.63034)
LEXR	0.043737***	0.030781***
	(5.94718)	(4.75396)
LMFER	0.029085*	s.i.
	(1.76611)	(0.189509)
EURO	0.256877***	0.190259***
	(6.04671)	(5.00193)
LRECI	0.418077***	0.505452***
	(13.5918)	(17.0347)
GERMAN	0.205376***	0.170023***
	(6.14801)	(5.64320)
MLOCK	s.i.	-0.061546*
	(0.038891)	(-1.91922)
XLOCK	-0.208009***	-0.139362***
	(-3.41988)	(-2.91649)

RESET test (p-value)	**0.00172**	**0.68922**

Source: Own calculations following POISSON-command and making use of TSP 4.5.
Variable Definitions: See Annex III.1.1.
Dependant Variable is the rounded absolute value of either Exports or Imports from country i to country j.
Into brackets, it can be found the t-statistics. Standard Errors are computed from analytic first and second derivatives (Eicker-White). Note that the presence of a constant is inherent to the model.
*** = 99%. ** = 95%. * = 90%. s.i. = statistically insignificant for α higher than 10%. n = 2 400.

The concluding remarks regarding the PML estimator are firstly focused on the slightly higher R-squared figures when compared to the OLS estimator, as it also happened when the PML estimator was applied to the cross-section data. However, there are other interesting conclusions to be obtained as regards to the coefficients presented by each independant variable in the regression.

In this respect, the lower coefficients obtained by LMPOP, LEIS, EURO and, in a major extent, by the LDIST and LXPOP variables as regards to the PML estimator, and the fact that income elasticities are significantly smaller than one must be highlighted. Thus, it can be concluded that standard OLS estimators greatly exaggerate the roles of income, distance, importing population and euro effect. Note that these above conclusions are also supported by SILVA & TENREYRO's (2003, 2004) findings related to the worldwide international trade.

Moreover, the independant variable LMLAND turns out to be statistically insignificant when the PML estimator is being applied. Simultaneously, LRDIST and GERMAN effects appear, for the first time related to panel data as statistically significant in a regular way, which at first sight would be economically expectable.

Finally, the main difference between the OLS and the PML estimators is related to the RESET test. Once again, this test shows a more statistically significant specification of the latter, mostly on what concerns to importing flows as dependant variable. However, the results also show that the specification is not acceptable enough as regards to the exporting flows as dependant variable. This must be due to the existence in the model of omitted variables that bring about the regression to be wrongly specified.

Poisson Pseudo-Maximum Likelihood Estimator including time dummies

By including time dummies in the PML estimator, we could avoid the existence of correlation in the model. However, the inclusion of such variables does not mean a significant alteration of the results previously obtained. Moreover, none of the dummies seem to be statistically significant.

Table II-8 – Significant Poisson Pseudo-Maximum Likelihood Estimator Model making use of Pooled Data and including time dummies as regards to Importing and Exporting flows (years 1999 to 2002)

Dependant Var.	**X**	**M**
(…)	(…)	(…)
Constant	-1.99884**	-0.926958
	(-2.49347)	(-1.27076)
Year2000	0.057683	0.050840
	(1.50389)	(1.59396)
Year2001	0.048138	0.047552
	(1.24386)	(1.43984)
Year2002	0.032178	0.034028
	(0.811992)	(0.984492)
RESET test (p-value)	**0.00008**	**0.99221**

Source: Own calculations following POISSON-command and making use of TSP 4.5.
Variable Definitions: See Annex III.1.1.
Dependant Variable is the rounded absolute value of either Exports or Imports from country i to country j.
Into brackets, it can be found the t-statistics. Standard Errors are computed from analytic first and second derivatives (Eicker-White). Note that the presence of a constant is inherent to the model.
*** = 99%. ** = 95%. * = 90%. s.i. = statistically insignificant for α higher than 10%. n = 2 400.

II.2.3 Estimation Results on Panel Data

The use of panel data methodology has several *advantages* over the cross-section analysis. First, panels make possible to capture the relevant relationships among variables over time. Second, a major advantage of using panel data is the ability to monitor the possible unobservable individual effects of trading-partner-pairs. In fact, when individual effects are omitted, the OLS estimates will be biased if individual effects are correlated with the regressors.

Fixed-Effects and Random Effects Models

By analysing the Simple Fixed-Effects Model, we will consider the available data not according to a *pooled-format* as done until now, but making use of a *panel format*. Furthermore, we will affect the error term as consisting of

two types. On one hand, those that are constant and, on the other hand, those errors that vary over time, as referred in Equation II-13.

Note that we could be also keen on allowing each trading pair to have its own dummy variable as referred in Equation II-14. However, as previously mentioned, this choice of specification would bring about the inclusion of, as many as, 600 dummies, which would lead us to untrustworthy conclusions due to the huge loss of degrees of freedom, *ceteris paribus* as regards to the number of observations. Indeed, our available time-series for each explanatory variable is relatively short, as it has been built up upon only four years. Thus, the OLS estimator would certainly be biased as a result of this short-time series within a panel data approach (see NICKELL (1981)). Note that this problem is also valid when referring to the Augmented Triple Fixed-Effect Model as referred by MÁTYÁS (1997) in Equation II-15.

Within this context, we would be interested in testing for an alternative Random-Effects Model by making use of HAUSMAN (1978) test. However, we are in the position of suspecting that the final decision will be based on a theoretical approach. In this sense, it is clear that the final choice would lie on the pure FEM, due to the feasible fact that some of the explanatory variables are indeed likely to be correlated with the respective unobserved effects or to the fact that the final purpose of the analysis is to calculate the foreseen potential trade flows based on particular effects caused by specific factors[155].

Table II-9 – Significant Simple Fixed-Effects and Random-Effects Models making use of Panel Data as regards to Importing and Exporting flows (years 1999 to 2002)

	FEM		REM	
Dependant Var.	**LX**	**LM**	**LX**	**LM**
R-Squared	**0.992253**	**0.992094**	**0.916302**	**0.917329**
Constant	n.a.	n.a.	-5.23655*** (-7.23291)	-6.28605*** (-6.79664)
LDIST	n.a.	n.a.	-0.961191*** (-15.2954)	-0.958065*** (-14.5673)

(cont.)

[155] In spite of the fact that the existence of a large number of countries points out to the choice of a REM in an attempt to avoid the excessive number of inherent dummy variables.

Table II-9 – Significant Simple Fixed-Effects and Random-Effects Models making use of Panel Data as regards to Importing and Exporting flows (years 1999 to 2002) (cont.)

	FEM		REM	
Dependant Var.	**LX**	**LM**	**LX**	**LM**
LMGDP	0.574335*** (6.50238)	0.719001*** (7.96217)	0.468919*** (14.8350)	0.437061*** (12.3030)
LXGDP	0.971154*** (10.2071)	0.816209*** (7.87662)	0.706844*** (21.9045)	0.784768*** (21.9065)
LMPOP	s.i. (0.284021)	s.i. (0.556975)	0.141783*** (3.64721)	0.160980*** (3.91995)
LXPOP	s.i. (0.564721)	s.i. (-0.368536)	-0.299758*** (-6.14937)	-0.253477*** (-6.21699)
NEIGH	n.a.	n.a.	0.179151* (1.69278)	0.181532* (1.68274)
LEIS	0.808274*** (3.64809)	0.613105** (2.33552)	0.812610*** (6.74327)	0.692893*** (5.50849)
LRDIST	s.i. (-0.754159)	s.i. (-0.132504)	s.i. (1.01899)	0.089323* (1.83653)
LXLAND	n.a.	n.a.	0.116275*** (2.81129)	s.i. (0.505619)
LEXR	s.i. (-0.169830)	s.i. (1.24156)	s.i. (1.39976)	0.026658*** (2.93596)
LMFER	s.i. (1.64366)	s.i. (-0.658482)	0.070490*** (5.02375)	0.042747*** (2.92931)
LXFER	s.i. (1.19178)	0.082540*** (2.64817)	0.039897*** (2.63249)	0.056480*** (3.78942)
EURO	n.a.	n.a.	0.353945*** (4.56003)	0.372100*** (4.68918)
LRECI	0.120778*** (3.79916)	0.129498*** (4.33293)	0.215931*** (11.0787)	0.241259*** (12.4175)
MLOCK	n.a.	n.a.	-0.275521*** (-3.87257)	-0.343558*** (-4.56582)
XLOCK	n.a.	n.a.	s.i. (0.761048)	0.213089*** (2.76665)
RESET test (p-value)	**0.00578**	**0.00077**	**0.00000**	**0.00000**

Source: Own calculations following PANEL-command and making use of TSP 4.5.
Variable Definitions: See Annex III.1.1.
Dependant Variable is the natural logarithm of either Exports or Imports from country i to country j.
The t-statistics are found in brackets. Standard Errors are heteroskedastic-consistent (HCTYPE=2). The estimations use WHITE (1980)'s heteroskedasticity-consistent covariance matrix estimator.
*** = 99%. ** = 95%. * = 90%. n.a. = not applicable. s.i. = statistically insignificant for α higher than 10%.
n = 2 400.

The obtained results must obviously be differentiated in terms of FEM or REM models. On what concerns the REM model, we can observe a similar R-squared when compared to the OLS estimator. Moreover, there are some interesting conclusions as regards to the coefficients presented by each independant variable in the regression.

In this respect, the lower coefficients obtained by LMPOP, LEIS (mostly having the importing flows as dependant variable) and, in a major extent, LRECI

variable as regards to the REM estimator, and the fact that income elasticities are significantly smaller than one must be highlighted. Simultaneously, higher coefficients are obtained by the LMGDP, LXGDP and LDIST variables (close to unity), which lead us to conclude that the REM model amplifies the previous mistake made by OLS as regards to the exaggeration of incomes and distance variables.

Finally, the REM estimator found no regular statistical significance for variables that were permanently significant regarding the previous OLS method, namely, NEIGH, ETHN, XLOCK, MLOCK, GERMAN, EURO, LXFER, LMFER, LEXR, LMLAND, LXLAND and also LINEQ variables.

Turning now our attention to the FEM estimator, the obtained results must be put in context by noticing that all the fixed-effect variables are inherently removed from the regression. Consequently, the regression presents a low number of statistically significant independant variables, namely LXGDP, LEIS, LMGDP and LRECI in this precise order in terms of statistical influence.

In this respect, we could economically infer that this regression is only referring to the time evolution within the considered 1999-2002 stage. This is due to the fact that all the effects that remain unchangeable during this period cannot cause any influence in the model because they were previously removed from the regression by its own construction. However, this seems to be an excellent model in terms of the capacity to explain the dynamic evolution of the trading flows throughout the considered period, especially if we take into account the figures obtained in terms of R-squared for both the importing and exporting flows (higher than 0.99).

Moreover, neither the REM nor the FEM models seem to be adequaly statistically specified, as it can be observed relatively to the RESET test figures.

Instrumental Variables Method

Given the inadequacy of the above methods for the purpose of our dissertation, we will make use of the Instrumental Variables method, according to HARRIS & MÁTYÁS (1998). This next step is due to the unsolved

endogeneity problem that the REM estimator left unsolved regarding those endogenous explanatory variables correlated to the unobserved effects.

In this respect, we follow the above-mentioned authors, and we make use of lagged variables as the instruments to remove their own endogeneity. Note that other endogeneity problems related to these lagged variables have been avoided throughout WU-HAUSSMAN test.

Thus, economically speaking, we would firstly suspect of the presence of endogeneity in the importing country's GDP variable as regards to the importing flows[156]. However, statistics do not follow previous economic expectations and conclude that the LMGDP variable does not statistically present any problem of endogeneity accordingly to the WU-HAUSSMAN test (its p-value equals 0.252). By contrast, the LRECI variable, referring to the opposite trading flow of the dependant variable, and the LXGDP variable, referring to the exporting country's nominal GDP at market prices, are observed to be statistically endogenous following the same WU-HAUSMAN methodology.

This economically unexpected result is not, nevertheless, repeated as regards to the exporting flows as dependant variable. In this respect, the exporting country's GDP presents statistical problems of endogeneity accordingly to WU-HAUSSMAN test, a situation that is also verified as regards to the LRECI variable. On the contrary, it is also concluded that LXGDP does not statistically present any problem of endogeneity (its p-value equals 0.298).

[156] Easily understood by following the GDP calculation according to the final-goods approach.

Table II-10 – Significant Instrumental Variables Model making use of Panel Data as regards to Importing and Exporting flows (years 1999 to 2002)

Dependant Var.	**LX**	**LM**
Endogeneous Var.	**LRECI, LXGDP**	**LRECI, LXGDP**
Instrumental Var.	**LRECI (-1), LXGDP (-1)**	**LRECI (-1), LXGDP (-1)**
R-Squared	**0.920279**	**0.920813**
Constant	-2.31880***	-1.88851***
	(3.28209)	(-2.56747)
LDIST	-0.630079***	-0.642324***
	(-12.5709)	(-13.9253)
LMGDP	0.203547***	0.140638***
	(6.11739)	(3.92265)
LXGDP	0.520974***	0.559281***
	(16.0891)	(16.0943)
LMPOP	0.247559***	0.198346***
	(6.69874)	(6.57642)
LXPOP	-0.265451***	-0.230098***
	(-9.07305)	(-7.47324)
NEIGH	0.119487**	s.i.
	(2.13192)	(1.59218)
ETHN	0.172286*	0.278654***
	(1.91949)	(2.72861)
LEIS	0.737777***	0.815577***
	(6.14197)	(6.69493)
LXLAND	0.112830***	0.038786*
	(5.79050)	(1.84824)
LMLAND	-0.068263***	s.i.
	(-2.74472)	(0.354661)
LEXR	0.014478**	0.034238***
	(2.37240)	(5.01341)
LMFER	0.065024***	0.042467***
	(5.51685)	(2.99874)
EURO	0.287552***	0.285093***
	(6.12985)	(6.24657)
LRECI	0.453102***	0.498768***
	(15.8795)	(17.3940)
GERMAN	0.098605**	0.075386*
	(2.18041)	(1.78197)
MLOCK	-0.283813***	-0.406423***
	(-6.79671)	(-9.49022)
XLOCK	0.108467**	0.266830***
	(2.39252)	(6.00014)
RESET test	**0.00000**	**0.00000**
(p-value)		

Source: Own calculations following IV-command and making use of TSP 4.5.
Variable Definitions: See Annex III.1.1.
Dependant Variable is the natural logarithm of either Exports or Imports from country i to country j.
The t-statistics are found in brackets. Standard Errors are heteroskedastic-consistent (HCTYPE=2). The estimations use WHITE (1980)'s heteroskedasticity-consistent covariance matrix estimator.
*** = 99%. ** = 95%. * = 90%. s.i. = statistically insignificant for α higher than 10%. n = 1 800.

We can observe in the above table that the R-squared figures are similar to those obtained with the OLS estimator. Moreover, there are other significant conclusions to be obtained as regards to the coefficients presented by each

independant variable in the regression. Indeed, it can be observed that only the LEIS variable presents a slightly lower coefficient when compared to that presented as regards to the OLS estimator. The LINEQ variable appears now as statistically insignificant and the LRECI's coefficient emerges as slightly higher. These almost negligible changes do not however imply any major modification in previously obtained conclusions.

As it also happened in the case of the OLS estimator, the figures obtained making use of the RESET test clearly indicates that the above regression presents some problems of misspecification and of missing variables. Once again, we are led to search for an alternative path in which both the specification and the included variables related are considered to be properly defined.

Poisson Pseudo Maximum Likelihood Estimator

At last, it must be also noted that the estimation of a PML estimator as regards to panel data could not be carried out making use of the Poisson command in the TSP 4.5, since the latter does not accept that possibility.

II.2.4 Actual and Potential Trade Flows

Although the Eastern enlargement of the EU is likely to give a further boost to trade flows, empirical evidence on the possible magnitudes is still scarce. The magnitude of these effects, in turn, has important implications for the effects that integration will have on labour markets, growth and structural adjustments both in Eastern and Western Europe. Therefore, our particular aim, throughout this section, will be to show the CEEC's relative position in terms of trading flows by comparing both the potential and the actual trade in 2002, considering this year as the threshold to their EU membership[157].

During the nineties, several authors focused their attention on the potential trade between the CEEC and the EU12[158], recognised as a "*major challenge for*

[157] Although the Romanian and Bulgarian accession will expectably only take place in January 2007.
[158] See for instance BIESSEN (1991), WANG & WINTERS (1991), HAMILTON & WINTERS (1992), ROSATI (1992), BALDWIN (1994), GROS & GONCIARZ (1996), NILSSON (2000), AFRICANO & TELES (2001), PACKAUSKAITE *et al.* (2002), EGGER (2002) or, mostly, AFRICANO (2004) as

European Community trade policy in the years ahead" by COLLINS & RODRIK (1991). For that purpose, a gravity model was estimated for EU or OECD countries and the parameters were used to project "natural" trade relations between these countries and the CEEC. The residual of the estimated equation was interpreted as the difference between potential and actual bilateral trade relations. Note that this projection is based on parameters that are built without taking into consideration the CEEC – an *out-of-sample projection approach* -. More recently, other authors such as BALDWIN (1994) and NILSSON (2000) have included the CEEC in the regression analysis. Therefore, the parameters obtained take into account also the effect represented by the CEEC – an *in-sample projection approach*-.

Interestingly, both methodologies agreed on concluding that the CEEC flows had been depressed far below what would have been expected, despite of the fact that they are recovering from that fact.

We made use of the *in-sample projection approach* for the calculation of the trade potential tackled throughout this dissertation. We followed this path by admitting that the trade behaviour of the CEEC is not different from the behaviour of the EU15 members. Supporting this idea is the fact that the inclusion of a CEEC dummy in the Poisson-based cross-section regression carried out in the previous section was concluded to be statistically insignificant.

Within this approach, the calculation of both potential exports and potential imports between the Central and Eastern European Countries and the Cohesion Countries will be based on the Poisson Pseudo-Maximum Likelihood estimator based on the cross-section parameters obtained in Chapter II.2.1, following an in-sample projection approach for the year 2002 and after the exclusion of the non-significant variables.

We selected the PML estimator based on the cross-section regression carried out for the year 2002 as our parameters for the calculation of the trade potential due to the fact that this estimator presented the best results of all the

regards to either the EU12 or the EU15 bilateral trading flows invoving the CEEC (or some of them). See also WANG (1992), KALBASI (2001), LAMOTTE (2002) and CHRISTIE (2002), regarding the

regressions tackled on. According to those results, the parameters obtained having the importing flows as dependant variable will be applied in this section aiming at calculating the bilateral trade potential of the several pairs of countries of the EU25.

The choice made to use the importing flows as the dependant variable was due to the better results displayed by this econometric construction, as described in the previous section. However, the subsequent inferences in terms of trade potential carried out in this section are presented from an exporting flows' perspective, calculated as the symmetric flows of the latter. This choice was made taking in consideration the clear preference of the main trade potential literature for this exporting flows' approach.

However, some specific problems that may appear while following this methodology must also be taken into account. In this respect, GROS & GONCIARZ (1996, pp. 714) point out that "*while the model has rather strong power in explaining trade patterns between countries, an attempt to estimate the trade level is extremely unreliable. This problem results from the sensitivity of the estimated coefficients to various valuation errors. Thus, especially the estimation accuracy of the constant term can have a strong influence on the predicted level of the trade flows*".

In addition, PAAS (2002, pp. 25) also defends that "*it is not reasonable to use gravity equations to forecast bilateral trade flows (but we can relativise evolutions)*". Hence, the relative results would enable us to conclude that industrialised countries and countries in transition in the context of the EU25 have good potential for developing bilateral trade relations. This conclusion is in accordance with the general trend identified in the development of international trade, which has been expressed by the rapid growth of the East-West trade relations in recent years.

By taking this statement into consideration, we must mention that large standard error bands of confidence are not expected due to the inherent PML estimator construction and the subsequent R-squared and RESET test figures

Chinese, Iranian, EU-related Yugoslavian and Southeast European countries potential trade, respectively.

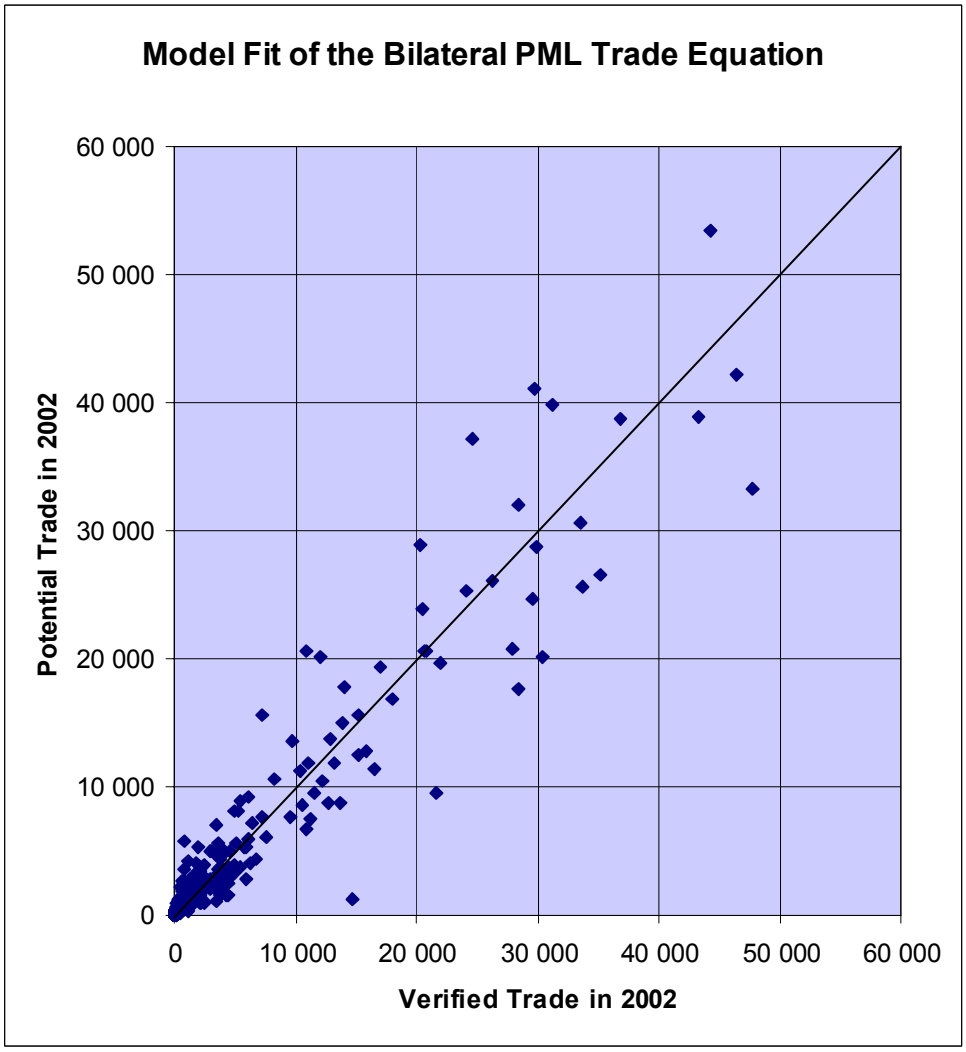
obtained. However, it must also be mentioned that the estimation accuracy of the constant term previously calculated is not as high as it would be desirable, mostly highlighting the fact that it was statistically insignificant. This fact can be an aspect of concern, as the PML estimator cannot be calculated without a constant term.

We will present the empirical calculations obtained as regards to the potential trade, but bearing in mind the above concern. In this respect, we should expect white-noise residuals from a consistent and efficient estimator, without additional systematic variation. Thus, if an estimator reveals large systematic differences between observed and in-sample predicted values, this should be interpreted as an indication of misspecification and parameter inconsistency[159].

However, the latter does not seem to be the case, as the below graph shows a clear correlation between potential trade and verified trade figures in 2002 (its R-squared equals 0.9165 and its observed linear tendency regression assumes the following form: POTTRADE = 216.02 + 0.9137 x VERIFIEDTRADE).

[159] The application of the random effects approach is problematic because of the likelihood of its inconsistency due to correlation between some of the explanatory variables and the unobserved individual effects.

Graph II-1 – Model Fit Between the Potential Bilateral Trade calculated according to the PML Estimator and the Verified Bilateral Trade in 2002 (€ billions)



Note that predicted values in terms of potential trade are calculated using the PML estimator.

The analysis of all above discussed matters, which have been broadly deepened throughout PART I, leads us to, at first sight, expect a progressive increase in trade flows between the CC and the CEEC, alongside an exporting pattern's shift. It is quite likely, however, that the CC's imports will increase more than its exports, resulting in a deterioration of the balance of trade with the CEEC, as defended by MARTÍN *et al.* (2002, pp. 16) as regards to the Spanish case.

Consequently, it can be concluded that the CC's role as EU25 Internal Market suppliers may be adversely affected by enlargement. This is the case not

only in low-tech sectors, but also in more dynamic and technologically advanced sectors, where the CEEC are increasingly active as a result of actions taken by investors and large foreign multinationals.

In this respect, our empirical conclusions, as regards to our CEEC exporting flows to the CC, is that their potential level, in 2002, was remarkably better (about 49.59%) than their current level, in this same year, accordingly to the PML estimator, whereas the CC exporting flows to the CEEC presented a slightly lower potential level (about –0.64%) than their current level. Therefore, at first sight, it can be expected that the dynamic process of enlargement will lead the CEEC to considerably increase their exports to the CC markets, at the same time the CC barely decrease their exports to the CEEC.

Nevertheless, these figures must discriminate between the several countries belonging to each one of the groups. Indeed, all the fourteen considered countries taken individually, present relatively different positions in terms of potential trade when compared to the current trade, despite the fact that each group is considered as a homogeneous set of countries, as we have observed throughout this dissertation.

In this respect, the relatively high potential trade observed as regards to the CEEC exporting flows to the CC is mostly due to the role of Slovenia (astonishing 285.61% higher than current trade), Slovakia (132.76%), Romania (60.24%), Poland (45.08%), Hungary (48.24%), the Czech Republic (26.19%), Latvia (17.47%) and Bulgaria (14.95%), despite of the lower figures observed for Estonia (-12.49%) or Lithuania (-19.60%).

Simultaneously, in what regards the CC's low performance related to their potential trade taking into consideration their exporting flows to the CEEC countries, the Irish (remarkable 34.92% lower than current trade) and the Spanish case (-11.94%) are the main responsibles, despite of the higher figures observed for Portugal (51.45%) or Greece (49.24%).

To sum up, we identify an important potential of exports towards the CC relatively to the current exporting flows as regards to seven of the ten considered CEEC countries. Moreover, some of the expected increases in terms of exporting

flows assume a more than remarkable dimension, namely in Slovenia and Slovakia.

In this respect, the enlargement can be interpreted as a damaging fact for the CC. Nevertheless, it must be also considered that two of the four CC present a great potential growth of their exporting flows towards the CEEC, namely Portugal and Greece. Consequently, it can be stated that these two countries may beneficiate from the May 2004 EU enlargement, from a bilateral trading perspective.

In addition, an analysis of the EU11 market must be also carried out, as it represents a market where both the CEEC and the CC appear as competing suppliers. In this respect, it can be observed that both the CEEC and the CC potential exporting flows towards the EU11 were slightly lower than current trade in 2002. However, there exist considerable differences depending on whether or not the EU11 exporting flows are linked to CEEC or CC markets. Whereas the EU11 exports towards the CEEC are expected to increase to match their potential extent, the EU11 exporting flows towards the CC are expected to decrease as they present a potential exporting size lower than the current flow.

Table II-11 – Estimated Manufacture Exporting Trade Flows in 2002 (in brackets as € billions) and its Relative Meaning when Compared to the Actual Manufacture Exporting Trade Flows in 2002 (in %)

	To **EU11**	**CEEC**	**CC**
From **EU11**	-0.18% (*) (1 064)	7.03% (*) (123)	-10.65% (*) (151)
CEEC	-5.05% (*) (104)	-10.09% (*) (20)	49.59% (+) (8)
CC	0.19% (*) (134)	-0.64% (*) (7)	-2.83% (*) (22)
Austria	32.20% (*) (51)	37.04% (*) (11)	22.42% (*) (3.4)
Belgium	-4.69% (*) (118)	15.49% (*) (5.1)	46.76% (+) (14)
Bulgaria	-10.91% (*) (2.5)	32.24% (*) (0.5)	14.95% (*) (0.5)

(cont.)

Table II-11 – Estimated Manufacture Exporting Trade Flows in 2002 (in brackets as € billions) and its Relative Meaning when Compared to the Actual Manufacture Exporting Trade Flows in 2002 (in %) **(cont.)**

	To **EU11**	**CEEC**	**CC**
Czech Republic	-6.66% (*)	-34.95% (*)	26.19% (*)
	(24)	(4.1)	(1.5)
Denmark	54.83% (+)	81.24% (+)	18.56% (*)
	(38)	(4.0)	(2.6)
Estonia	-18.22% (*)	-11.61% (*)	-12.49% (*)
	(2.2)	(0.4)	(0.1)
Finland	-21.70% (*)	-35.06% (*)	-39.12% (*)
	(17)	(2.1)	(1.2)
France	18.50% (*)	-19.44% (*)	-6.72% (*)
	(174)	(9.7)	(33)
Germany	-16.13% (*)	8.97% (*)	-17.95% (*)
	(247)	(54)	(34)
Greece	230.77% (++)	49.24% (+)	343.43 (++)
	(14)	(1.5)	(1.7)
Hungary	-19.36% (*)	22.68% (*)	48.24% (+)
	(19)	(4.0)	(1.4)
Ireland	-55.41% (-)	-34.92% (*)	-51.66% (-)
	(22)	(0.7)	(1.4)
Italy	9.57% (*)	-24.39% (*)	-8.37% (*)
	(110)	(14)	(20)
Latvia	-10.84% (*)	56.47% (+)	17.47% (*)
	(1.6)	(0.5)	(0.1)
Lithuania	22.73% (*)	8.83% (*)	-19.60% (*)
	(2.9)	(0.9)	(0.2)
Luxembourg	43.75% (*)	64.46% (+)	26.49% (*)
	(11)	(0.4)	(0.7)
Netherlands	-15.12% (*)	38.17% (*)	3.33% (*)
	(124)	(7)	(13)
Poland	5.77% (*)	-13.39% (*)	45.08% (*)
	(27)	(3.9)	(1.9)
Portugal	5.40% (*)	51.45% (+)	70.43% (+)
	(18)	(0.9)	(8.8)
Romania	-13.48% (*)	91.31% (+)	60.24% (+)
	(8.3)	(1.8)	(1.0)
Slovakia	-7.58% (*)	-38.66% (*)	132.76% (+)
	(8.6)	(2.5)	(0.7)
Slovenia	25.03% (*)	19.92% (*)	285.61% (++)
	(8.2)	(1.4)	(0.7)

(cont.)

Table II-11 – Estimated Manufacture Exporting Trade Flows in 2002 (in brackets as € billions) and its Relative Meaning when Compared to the Actual Manufacture Exporting Trade Flows in 2002 (in %) **(cont.)**

	To **EU11**	**CEEC**	**CC**
Spain	25.35% (*)	-11.94% (*)	-22.84% (*)
	(80)	(3.7)	(9.7)
Sweden	-26.39% (*)	8.32% (*)	-31.53% (*)
	(32)	(4.3)	(2.3)
United Kingdom	23.57% (*)	54.48% (+)	-28.54% (*)
	(143)	(11)	(26)

Source: Authors' own calculations following previous PML estimator coefficients accordingly to cross-section data.
(++) - the estimated trade flows are at least two times higher than the verified trade flows.
(+) - the estimated trade flows are less than two times higher than the verified trade flows.
(*) - the estimated trade flows are almost in accordance with the verified trade flows.
(-) - the estimated trade flows are less than two times or more lower than the verified trade flows.
(--) - the estimated trade flows are at least two times or more lower than the verified trade flows.

Furthermore, by analysing bilateral potential trading flows between CEEC and CC countries, from an individual perspective, in the tables below (Table II-12 and Table II-13), i.e. from a country-to-country approach, we observe that the CEEC current exporting flows, in 2002, were greatly overcome by their respective potential levels in the cases of the Lithuanian (1 788.79% higher), Slovenian (315.15%), Estonian (257.45%) and Polish (115.55%) exports towards *Greece*. This was also the case of the Slovenian (500.34%), Romanian (400.51%), Slovakian (372.98%), Bulgarian (226.32%), Polish (174.15%) and Czech (116.51%) exports towards *Ireland*. Simultaneously, the Slovenian (236.98%), Romanian (196.90%), Slovakian (178.29%) and Hungarian (171.03%) exports towards *Portugal*, and the Slovenian (266.51%), Slovakian (127.54%) and Latvian (102.89%) potential exports levels towards *Spain* came also higher than their actual levels.

Additionally, the CC exporting flows, in 2002, were greatly overcome by their respective potential levels in the cases of Greece (297.48%) exports towards *the Czech Republic*. The Greek (178.6%), Spanish (143.1%) and Portuguese (141.7%) exports towards *Estonia* also verified this phenomenon. This was also the case of the Greek (241.7%) exports towards *Hungary*, the Greek (444.6%), Portuguese (298.5%) and Irish (115.04%) exports towards *Latvia* and the Portuguese (256.9%) and Spanish (106.4%) exports towards *Lithuania*. Last but

not least, the Greek (179.0%) exports towards *Poland*, the Greek (306.6%) exports towards *Slovakia* and also the Portuguese (141.3%) exports towards *Slovenia* also experienced higher potential exports than their actual levels.

All these above flows mean a reorientation process that is still in progress. However, the major part of the bilateral flows has already fulfilled their potential trade. In this respect, only the Portuguese and Greek exporting flows towards the CEEC, on one hand, and mostly the Slovenian and Slovakian exporting flows towards the CC, on the other hand, present a remarkable exporting growth, as showed by their potential flows far above their current flows, in 2002.

Table II-12 – Estimated Manufacture Exporting Trade Flows From the CEEC to the CC in 2002 (€ millions) and its Relative Meaning when Compared to the Actual Manufacture Exporting Trade Flows From the CEEC to the CC in 2002 (%)

	To **Greece**	**Ireland**	**Portugal**	**Spain**
From **Bulgaria**	4.38% (*)	226.32% (++)	419.67% (++)	6.96% (*)
	(296)	(22)	(35)	(149)
Czech Republic	-2.58% (*)	116.51% (+)	18.12% (*)	20.14% (*)
	(172)	(257)	(195)	(854)
Estonia	257.45% (++)	35.09% (*)	-36.33% (*)	-37.05% (*)
	(16)	(31)	(16)	(44)
Hungary	67.19% (+)	40.08% (*)	171.03% (++)	32.26% (*)
	(194)	(201)	(188)	(791)
Latvia	91.88% (+)	-19.05% (*)	-41.16% (*)	102.89% (+)
	(15)	(21)	(13)	(38)
Lithuania	1 788.79% (++)	47.29% (*)	-53.48% (-)	-42.25% (*)
	(37)	(38)	(23)	(92)
Poland	115.55% (+)	174.15% (+)	-26.55% (*)	48.60% (+)
	(289)	(310)	(272)	(1 049)
Romania	40.07% (*)	400.51% (++)	196.90% (++)	45.58% (+)
	(402)	(79)	(94)	(387)
Slovakia	57.33% (+)	372.98% (++)	178.29% (+)	127.54% (+)
	(83)	(71)	(89)	(467)
Slovenia	315.15% (++)	500.34% (++)	236.98% (++)	266.51% (++)
	(132)	(68)	(69)	(455)

Source: Authors' own calculations following previous PML estimator coefficients accordingly to cross-section data.
(++) - the estimated trade flows are at least two times higher than the verified trade flows.
(+) - the estimated trade flows are less than two times higher than the verified trade flows.
(*) - the estimated trade flows are almost in accordance with the verified trade flows.
(-) - the estimated trade flows are less than two times or more lower than the verified trade flows.
(--) - the estimated trade flows are at least two times or more lower than the verified trade flows.

Table II-13 – Estimated Manufacture Exporting Trade Flows From the CC to the CEEC in 2002 (€ millions) and its Relative Meaning when Compared to the Actual Manufacture Exporting Trade Flows From the CC to the CEEC in 2002 (%)

	To **Bulgaria**	**Czech Republic**	**Estonia**	**Hungary**	**Latvia**	**Lithuan.**	**Poland**	**Romania**	**Slovakia**	**Slovenia**
From **Greece**	-26.21% (*) (348)	297.48% (++) (209)	178.6% (+) (17)	241.7% (+) (177)	444.6% (++) (30)	28.79% (*) (17)	179.0% (++) (303)	9.29% (*) (284)	306.6% (++) (95)	52.41% (+) (68)
Ireland	21.40% (*) (22)	-44.44% (*) (146)	-18.7% (*) (29)	-44.8% (*) (117)	115.4% (+) (42)	24.9% (*) (43)	-36.8% (*) (209)	-49.27% (-) (33)	-40.35% (*) (34)	-37.3% (*) (24)
Portugal	24.78% (*) (31)	80.77% (+) (177)	141.7% (+) (27)	-17.3% (*) (101)	298.5% (++) (32)	256.9% (++) (51)	66.46% (+) (356)	7.25% (*) (55)	7.99% (*) (60)	141.3% (+) (45)
Spain	57.49% (+) (252)	2.08% (*) (725)	143.1% (+) (84)	-18.5% (*) (564)	63.78% (+) (57)	106.4% (+) (176)	-23.0% (*) (998)	3.33% (*) (304)	-44.1% (-) (296)	-35.1% (*) (216)

Source: Authors' own calculations following previous PML estimator coefficients accordingly to cross-section data.
(++) - the estimated trade flows are at least two times higher than the verified trade flows.
(+) - the estimated trade flows are less than two times higher than the verified trade flows.
(*) - the estimated trade flows are almost in accordance with the verified trade flows.
(-) - the estimated trade flows are less than two times or more lower than the verified trade flows.
(--) - the estimated trade flows are at least two times or more lower than the verified trade flows.

Perhaps the most important conclusion is that the classical question about the CEEC countries: "*Have they already reached their potential?*" receives a very differentiated answer depending on which specific country one considers. It outstands that Lithuania, Bulgaria and Estonia have already reached their potential trade as regards to the CC, whereas the rest seven CEEC countries still have some way to go, mostly Slovenia and Slovakia.

As a concluding remark regarding the CC countries, it can be observed how Portugal and Greece are still reorienting their trade flows towards the CEEC and trying to embrace foreign trade opportunities within these new ten markets, whereas Spain and Ireland had already fulfilled these trading opportunities by 2002.

Net Bilateral Trading Flows in Manufactures and Implications on respective Trade Balances

By taking into consideration both the potential importing and potential exporting flows involving CEEC and CC, we would be able to calculate the respective net bilateral trading flows. Thus, we are in a favourable condition to infer the net effects brought about by the trade adjustments on the CEEC and the CC related to the eastern enlargement of the EU15. Consequently, we conclude on the existence of net trading gains or net trading losses. These expected effect can be observed in Table II-14.

Table II-14 – Comparison between Potential Trade Balance (in bold) and Verified Trade Balance (in brackets) as regards to the Manufacturing trade balances involving the CEEC and the CC in 2002 (€ millions)

Between	CC	Greece	Ireland	Portugal	Spain
CEEC	**1 197** (*-1 516)*	**86** (*57)*	**398** (*-575)*	**59** (*173)*	**655** (*-1 171)*)
Bulgaria	**-153** (*-239)*	**-52** (*-189)*	**0** (*-11)*	**4** (*-18)*	**-104** (*-21)*
Czech Rep.	**221** (*48)*	**-37** (*124)*	**111** (*-143)*	**18** (*67)*	**129** (*0.3)*
Estonia	**-50** (*35)*	**-0.7** (*-1.5)*	**2.2** (*-12)*	**-12** (*13)*	**-40** (*36)*
Hungary	**416** (*-150)*	**17** (*64)*	**84** (*-68)*	**88** (*-52)*	**227** (*-94)*
Latvia	**-75** (*5.8)*	**-15** (*2.4)*	**-21** (*6)*	**-20** (*13)*	**-19** (*-16)*
Lithuania	**-96** (*90)*	**20** (*-12)*	**-4.6** (*-8.2)*	**-28** (*35)*	**-83** (*75)*
Poland	**54** (*-626)*	**-14** (*25)*	**100** (*-218)*	**-84** (*156)*	**52** (*-590)*
Romania	**286** (*-70)*	**118** (*27)*	**46** (*-50)*	**39** (*-19)*	**83** (*-28)*
Slovakia	**224** (*-361)*	**-12** (*29)*	**36** (*-42)*	**29** (*-23)*	**171** (*-324)*
Slovenia	**369** (*-248)*	**63** (*-13)*	**44** (*-27)*	**24** (*1.9)*	**238** (*-209)*

Source: Authors' own calculations following previous PML estimator coefficients accordingly to cross-section data.

First and foremost, the remarkable difference observed between the verified and the potential trading balance involving both the Central and Eastern European Countries and the Cohesion Countries must be highlighted. At this respect, it can be observed that the verified manufacturing trade balance benefited the latter group of countries, whose trading surplus with the CEEC accounted for € 1 516 millions, whereas the potential manufacturing trade balance pointed out precisely on the other way, with the CEEC presenting a trading surplus that accounted for € 1 197 millions. This is quite a remarkable

conclusion by itself, but the related figures must yet be disaggregated according to each involved country-effect.

Thus, on what concerns the CC net trading effects related to the enlargement, it can be observed that the previous conclusions stating that the relatively better position displayed by both Portugal and Greece when compared to Spain and Ireland in terms of potential exporting flows is reaffirmed. Nevertheless, all the four CC present a negative potential manufacturing trade balance with the CEEC as a whole.

However, the magnitudes assumed by these trade unbalances vary remarkably, ranging from a negligenciable € 59 millions in the Portuguese case, € 86 millions in the Greek case, € 398 millions in Ireland and to € 655 millions in Spain, respectively. Consequently, it can be stated that Portugal is the CC economy that is least harmed by the eastern enlargement of the EU15 in terms of bilateral trading flows adjustments, whereas Spain emerges as the most injured CC economy.

Furthermore, comparing both the actual and the potential trade balances in manufactures for the year of 2002, these above conclusions are emphasized. Indeed, whereas the Irish and Spanish economies presented a large surplus in terms of their verified manufacturing trade balance, their respective potential manufacturing trade balances were statistically expected to present high deficits. Consequently, these two economies are expected to suffer the most in trading terms due to the eastern enlargement of the EU15. It must also be noted that the Greek case emerges as an analogous case to the latter, but in a minor scale.

On the contrary, the Portuguese verified trade deficit with the CEEC is expected to be remarkably reduced by taking into consideration its respective potential trade deficit. Indeed, whereas the verified flows accounted for € 201 millions of deficit on the Portuguese manufacturing trade balance, the potential flows summed up to € 59 millions. Therefore, the calculations carried out in this dissertation allow us to state that Portugal is the only CC that is expected to improve its bilateral trade position with the CEEC in the threshold of the eastern enlargement of the EU15. This will be mostly achieved by improving its bilateral

manufacturing trade balances with the Czech Republic, Poland and, in a minor scale, with the three Baltic countries.

On the other hand, and turning our attention to the CEEC, we are once again in the position of splitting the ten countries into two different groups according to their relative performance as regards to their potential trading balance in the threshold of the enlargement of the EU15. At this respect, whereas Bulgaria, Estonia, Latvia and Lithuania are expected to worsen their trading balances with the CC, the Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia are expected to see their trading balances with the CC improve.

Lastly, these same results appear relativised by their respective GDP in the following table.

Table II-15 – Comparison between Potential Trade Balance (in bold) and Verified Trade Balance (*in italic and into brackets*) as regards to the Manufacturing trade balances involving the CEEC and the CC in 2002 (% GDP)

Between	CC	Greece	Ireland	Portugal	Spain
CEEC	(% CEEC's GDP): **0.25%** (*-0.31%*) (% CC's GDP): **0.11%** (*-0.14%*)	(% Greek GDP): **0.06%** (*0.04%*)	(% Irish GDP): **0.31%** (*-0.44%*)	(% Portuguese GDP): **0.05%** (*0.13%*)	(% Spanish GDP): **0.09%** (*-0.17%*)
Bulgaria	(% Bulgarian GDP): **-0. 92%** (*-1.44%*)	(% Bulgarian GDP): **-0.32%** (*-1.14%*) (% Greek GDP): **-0.04%** (*-0.13%*)	(% Bulgarian GDP): **0.00%** (*-0.07%*) (% Irish GDP): **0.00%** (*-0.01%*)	(% Bulgarian GDP): **0.02%** (*-0.11%*) (% Portuguese GDP): **0.00%** (*-0.01%*)	(% Bulgarian GDP): **-0.63%** (*-0.13%*) (% Spanish GDP): **-0.01%** (*0.00%*)
Czech Rep.	(% Czech GDP): **0.30%** (*0.07%*)	(% Czech GDP): **-0.05%** (*0.17%*) (% Greek GDP): **-0.03%** (*0.09%*)	(% Czech GDP): **0.15%** (*-0.19%*) (% Irish GDP): **0.09%** (*-0.11%*)	(% Czech GDP): **0.02%** (*0.09%*) (% Portuguese GDP): **0.01%** (*0.05%*)	(% Czech GDP): **0.17%** (*-0.00%*) (% Spanish GDP): **0.02%** (*-0.00%*)
Estonia	(% Estonian GDP): **-0.72%** (*0.50%*)	(% Estonian GDP): **-0.01%** (*-0.02%*) (% Greek GDP): **0.00%** (*0.00%*)	(% Estonian GDP): **0.03%** (*-0.18%*) (% Irish GDP): **0.00%** (*-0.01%*)	(% Estonian GDP): **-0.17%** (*0.19%*) (% Portuguese GDP): **-0.01%** (*0.01%*)	(% Estonian GDP): **-0.58%** (*0.52%*) (% Spanish GDP): **-0.01%** (*0.01%*)
Hungary	(% Hungarian GDP): **0.60%** (*-0.22%*)	(% Hungarian GDP): **0.02%** (*0.09%*) (% Greek GDP): **0.01%** (*0.05%*)	(% Hungarian GDP): **0.12%** (*-0.10%*) (% Irish GDP): **0.07%** (*-0.05%*)	(% Hungarian GDP): **0.13%** (*-0.08%*) (% Portuguese GDP): **0.07%** (*-0.04%*)	(% Hungarian GDP): **0.33%** (*-0.14%*) (% Spanish GDP): **0.03%** (*-0.01%*)
Latvia	(% Latvian GDP): **-0.84%** (*0.06%*)	(% Latvian GDP): **-0.17%** (*0.03%*) (% Greek GDP): **-0.01%** (*0.00%*)	(% Latvian GDP): **-0.24%** (*0.07%*) (% Irish GDP): **-0.02%** (*0.00%*)	(% Latvian GDP): **-0.22%** (*0.15%*) (% Portuguese GDP): **-0.02%** (*0.01%*)	(% Latvian GDP): **-0.21%** (*-0.18%*) (% Spanish GDP): **0.00%** (*0.00%*)

(cont.)

Table II-15 – Comparison between Potential Trade Balance (in bold) and Verified Trade Balance (in *italic and into brackets)* as regards to the Manufacturing trade balances involving the CEEC and the CC in 2002 (% GDP) (cont.)

Between	CC	Greece	Ireland	Portugal	Spain
Lithuania	(% Lithuanian GDP):	(% Lithuanian GDP):	(% Lithuanian GDP):	(% Lithuanian GDP):	(% Lithuanian GDP):
	-0.66% (*0.61%*)	**0.13%** (*-0.08%*)	**-0.03%** (*-0.06%*)	**-0.19%** (*0.24%*)	**-0.57%** (*0.51%*)
		(% Greek GDP):	(% Irish GDP):	(% Portuguese GDP):	(% Spanish GDP):
		0.01% (*-0.01%*)	**-0.00%** (*-0.01%*)	**-0.02%** (*0.03%*)	**-0.01%** (*0.01%*)
Poland	(% Polish GDP):	(% Polish GDP):	(% Polish GDP):	(% Polish GDP):	(% Polish GDP):
	0.03% (*-0.31%*)	**-0.01%** (*0.01%*)	**0.05%** (*-0.11%*)	**-0.04%** (*0.08%*)	**0.03%** (*-0.29%*)
		(% Greek GDP):	(% Irish GDP):	(% Portuguese GDP):	(% Spanish GDP):
		-0.01% (*0.02%*)	**0.08%** (*-0.17%*)	**-0.07%** (*0.12%*)	**0.01%** (*-0.08%*)
Romania	(% Romanian GDP):	(% Romanian GDP):	(% Romanian GDP):	(% Romanian GDP):	(% Romanian GDP):
	0.59% (*-0.14%*)	**0.24%** (*0.06%*)	**0.09%** (*-0.10%*)	**0.08%** (*-0.04%*)	**0.17%** (*-0.06%*)
		(% Greek GDP):	(% Irish GDP):	(% Portuguese GDP):	(% Spanish GDP):
		0.08% (*0.02%*)	**0.04%** (*-0.04%*)	**0.03%** (*-0.01%*)	**0.01%** (*0.00%*)
Slovakia	(% Slovakian GDP):	(% Slovakian GDP):	(% Slovakian GDP):	(% Slovakian GDP):	(% Slovakian GDP):
	0.89% (*-1.44%*)	**-0.05%** (*0.12%*)	**0.14%** (*-0.17%*)	**0.12%** (*-0.09%*)	**0.68%** (*-1.29%*)
		(% Greek GDP):	(% Irish GDP):	(% Portuguese GDP):	(% Spanish GDP):
		-0.01% (*0.02%*)	**0.03%** (*-0.03%*)	**0.02%** (*-0.02%*)	**0.02%** (*-0.05%*)
Slovenia	(% Slovenian GDP):	(% Slovenian GDP):	(% Slovenian GDP):	(% Slovenian GDP):	(% Slovenian GDP):
	1.58% (*-1.06%*)	**0.27%** (*-0.06%*)	**0.19%** (*-0.12%*)	**0.10%** (*0.01%*)	**1.02%** (*-0.90%*)
		(% Greek GDP):	(% Irish GDP):	(% Portuguese GDP):	(% Spanish GDP):
		0.04% (*-0.01%*)	**0.03%** (*-0.02%*)	**0.02%** (*0.00%*)	**0.03%** (*-0.03%*)

Relative values as regards to respective GDP can be found into brackets. Thus, in the very first line into brackets, it can be found the relative value of the respective manufacturing trade balance as regards to the GDP of the respective CEEC. In the second line into brackets, it can be found the relative value of the respective manufacturing trade balance as regards to the GDP of the respective CC.

Source: Authors' own calculations following previous PML estimator coefficients accordingly to cross-section data.

CHAPTER III – Limitations of the Analysis and Suggestions for Future Research

In the very first stage of this final chapter, we will consider a few gravity model features concerning the functional form of the gravity equation and the nature of the error term, in an attempt to preserve the robustness of our results. Additionally, we will turn our attention to the limitations of the analysis carried out throughout this dissertation and also to the several suggestions that can be made as regards to future researching work.

As regards to the functional form of the gravity equation, the first aspect to be pointed out is the absence, in the data, of bilateral trade flows that assume *Zero Values*, which would have represented a serious difficulty to be tackled, particularly when using the log-linear form of the model. Thus, as SILVA & TENREYRO (2003, pp. 3) pointed out "*a related problem with the analogy between Newtonian gravity and trade is that gravitational force can be very small, but never zero, whereas trade between several pairs of countries can be literally zero*".

These zero flows are economically explained by the existence of excessively large variable or fixed costs or, in addition, mathematically due to rounding errors (if trade is measured in thousand of euros, as in our case) or missing observations which are wrongly recorded as zero.

Unfortunately, the empirical literature has, as a rule, either ignored this problem or addressed it with unsatisfactory approaches[160]. Indeed, the approach usually followed by the large majority of empirical studies is simply to drop the pairs with zero trade from the data set and then to estimate the log-linear form by OLS[161]. This truncation, however, makes the OLS estimator inconsistent, as

[160] Excellent revisions of all the methods developed to deal with this problem can be observed in FEENSTRA, LIPSEY & BOWEN (1997) and FRANKEL (1997).
[161] See BRADA & MENDEZ (1985), BIKKER (1987), LINNEMANN & BEERS (1988), BEERS & LINNEMANN (1992), KALBASI (2001) and CHENG & WALL (2002) as examples.

referred by SILVA & TENREYRO (2003, pp.11), with the problem obviously depending on the particular characteristics of the sample and model used[162].

Alternatively, some other authors opted for substituting the zeroes with arbitrary small numbers, such as one thousand euros[163], in spite of the obvious drawback of being *ad hoc* and the, not so obvious, weakness of the logaritm of a small positive number being an outsized negative number[164].

In addition, an innovative technique was applied aiming at expressing the dependant variable in levels rather than logs, namely in the semi-log formulation[165]. Subsequently, it turns out to be necessary to make use of the *Tobin estimate* to truncate zero values, according to which separate parameters are estimated aiming at determining whether an observation in nonzero and, in that case, the coefficients to be established.

Moreover, other authors attempt to solve the zeroes problem by expressing the dependant variable as the log of (1 + $TRADE_{ij}$), employed by EICHENGREEN & IRWIN (1995, 1998), where the TRADE variable represents either the importing or the exporting flows.

More recently, the most successful method, appears to be the estimation of gravity equations in their multiplicative form (being FRANKEL & WEI (1993a) the modern pioneer - Equation II-10). Furthermore, the PML is also used, given that, as it was proved by SILVA & TENREYRO (2003, pp. 18), "*the estimated coefficients are remarkably similar using both the whole sample and the positive-trade sub-sample, (...) in view of the fact that observations with zero trade correspond to pairs for which the estimated value of trade is close to zero*".

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[162] The authors considered that "*if the rounded-down observations were partially compensated by rounded-up ones, the overall effect of these errors would be relatively minor. However, because there is a large number of pairs of countries for which the value of bilateral trade is expected to be very small, e.g. under €500, it is not likely that the rounding down will be totally offset. Moreover, the rounding down is more likely to occur for small or distant countries and, therefore, the probability of rounding down will depend on the value of the covariates, leading to the inconsistency of the estimators*".

[163] See LINNEMANN (1966), WANG & WINTERS (1991), PIANI & KUME (2000) and KALBASI (2001) as examples.

[164] Namely in the OLS regression, that gives larger weight to extreme values, whether large or small, the zero pairs might then receive too large a weight in the estimates.

[165] See BIESSEN (1991), HAVRYLYSHYN & PRITCHETT (1991) and EATON & TAMURA (1994) as the main examples of this method.

However, there are no zero trade flows in this dissertation's data sample and, hence, there is no need for a Tobin estimator or any other of the suggested solution.

A second limitation that can be highlighted is the *Level of Disaggregation* used in the analysis. The decomposition of classes throughout this dissertation has been based on six-digit classes within EUROPEAN COMMISSION's Comext database and following the Harmonized System TARIC. Simultaneously, we attempted to avoid two-digit 99 class-products, given problems related to heterogeneity. At a six-digit level of disaggregation many manufactured products are believed to consist of quite homogeneous classes of products or substitutable commodities.

Authors such as KELLMAN & SCHRODER (1983) recommended, in the context of studies making use of either EIS or COS-measures, that these techniques should also attempt to examine alternative levels of commodity aggregation, apart from the analyses of changes in terms of trend and cycles in the structure of trade-vector similarity patterns.

Note that another alternative path was simultaneously inaugurated by both BUCH & PIAZOLO (2000) and GARCÍA-MENÉNDEZ *et al.* (2000), making use of *Regionally Disaggregated Data* instead of the classical national data as a whole.

A third limitation should be taken into account, in our analysis, is the source of the available data. In fact, it is astonishing that the "Other Products" Class (Code 99) is between the most traded class products according to the Bulgarian and Irish border authorities. This verification points out to the fact that the *Statistical Recording* of products may not be done consistently in all countries, introducing an unavoidable bias in the sample.

Indeed, this lack of rigor in the case of the Bulgarian border authorities has been repeatedly pointed out by the European Commission as one of the main points to be improved for their EU adhesion (EUROPEAN COMMISSION (2003c)). Consequently, the inclusion of such a heterogeneous class in our dissertation would represent a potential drawback for the obtained results and,

therefore, the 99-class was not taken into consideration in our analysis carried out as regards to the Trade Similatity Indexes.

Additionally, it must be reminded the fact that our analysis only focuses on trade possibilities, setting aside other interesting features such as *Trade Creation*, considering both consumer and producer surpluses in the domestic market, or *Trade Diversion*, considering both consumer and producer surpluses in third countries' markets (Russia in particular as regards to the CEEC, but also countries such as Norway or United States). Furthermore, a more detailed *Intra-Industry Trade* analysis could be done using quality-product indicators or factorial allocations as regards to the trading flows.

Moreover, as regards methodological problems, special attention must be paid to the possible existence of *Heteroskedasticity* (inconsistent variance of the error terms) and *Collinearity* (correlation between independant variables). In this respect, the main concern of the PML methodology lies in avoiding endogeneity problems, which were constantly present in previous studies. This conclusion could also have been complemented by making use of a General Method ofMoments or a Feasible Generalised Least Squares. At this respect, further upgrade efforts will be made on what concerns to the panel-data approach in subsequent applications of the conclusions achieved in this dissertation, mostly by making use of the PML estimator.

Furthermore, the only tool used in our analysis, for tackling the potential danger represented by the heteroskedasticity problem was the WHITE's heteroskedasticity-consistent co-variance matrix (WLS) method (1980)[166], although the inclusion of *per capita* income may also prove to significantly lower the heteroskedastic level (see KALBASI (2001, pp. 7)).

Apart from these previous possible steps, it must also be mentioned that the average convergence speed in terms of both verified and potential trade fulfilment, defined for the first time by JAKAB, KOVACS & OSZLAY

[166] See BEERS & BIESSEN (1996), PIANI & KUME (2000), PAAS (2002, 2003), THARAKAN (2002) or GARCÍA-MENÉNDEZ *et al.* (2002) as examples.

(2001)[167], would be extremely interesting for our purposes in this dissertation. Notwithstanding, we would have needed a larger time range for data at our disposal.

Moreover, a parallel analysis may be carried out paying special attention to the existing bilateral potential flows as regards to the ten CEEC or, furthermore, as regards to the four CC. That is to say, an analysis of the bilateral potential trading flows involving, for instance, the Czech Republic and Poland, on one side, or Portugal and Spain, on the other.

As a final thought, it must be noted that, in terms of economic policy, a crucial shortcoming of this analysis lies in the fact that it only pays attention to the *manufacturing sector*, not merely putting aside the agricultural sector (for the already referred reasons), but also the huge services sector, which represents, on average, approximately 70% of GDP of the considered countries, throughout this dissertation. However, the availability of data regarding services is not as trustworthy and detailed as it would be necessary for tackling an analogous study in terms of services.

[167] Defined as as the rate of the average potential trade growth divided by the rate of the average verified trade growth.

CONCLUSION

The last enlargement of the European Union, that took place on May 2004, will certainly have important implications in the economic domain as regards to the Cohesion Countries (CC), the Central and Eastern European Countries (CEEC) and also the remaining countries belonging to the EU25 (EU11). Within this approach, we focused on the *trade adjustment*[168] brought about by this eastern enlargement on these three distinct groups of countries, paying special attention to the effects that will expectedly be borne by the Cohesion Countries and, namely, by Portugal.

More specifically, the subsequent bilateral foreign trade adjustments that are expected to occur due to the eastern enlargement of the EU15 were inferred, from the available data, for the 1999-2002 period. These adjustments are particularly relevant mostly by taking into consideration the fact that the promotion of the exporting flows represents one of the pillars of the Portuguese Programme for Productivity and Economic Growth[169].

Trade adjustment

The likely impact of the EU15 eastern enlargement and the resulting repercussions of the subsequent *trade adjustment* brought about on the CC economies can be inferred from the predictions of both the theory of international trade and the theory of economic integration. On one hand, it is expected that the bilateral trade with the more recent members will expand and, on the other hand, it is also expected that some CC exporting flows to the EU11 will be substituted by those of the CEEC.

Both theoretical predictions perfectly match the main conclusions observed throughout this dissertation. However, the intensity of these effects will

[168] Note that *trade adjustment* merely represents the comprehensive effects, related to the terms of trade, brought about by some exogeneous shock, such as the Eastern enlargement of the EU15 in our case.
[169] "Plano para a Produtividade e o Crescimento da Economia", approved by resolution of the Portuguese Council of Ministers n. 103/2002, on July 26th.

depend on the degree of similarity between the CC's and the CEEC's complementar trading flows, as analysed regarding the Commodities Composition of Trade Indexes.

In this respect, it should be taken into consideration that an examination of the CCT between two countries at a given point in time reflects a situation that arises from several aspects. These include specific demand patterns, classical comparative advantages, product differentiation, economies of scale and level of technological development.

We took into consideration the two Trade Similarity Indexes that have alternatively been used in this dissertation as two methods of measuring the degree of complementarity between the trading structures of different countries, namely the Cosine Measure (COS) and the Export-Import Similarity Index (EIS). However, in spite of, to some extent, obtaining similar results, better outcomes are obtained with the EIS than with the COS-measure. This may partly be due to the relatively larger variance of the latter.

As regards changes in the export pattern, in spite of the fact that most CEEC show relevant structural changes in the period analysed, there are two groups that can be clearly differentiated. Latvia, Lithuania, Romania and also Bulgaria remain dominated by the traditional manufacturing specialisation, based on labour-intensive industries, whereas in the remaining CEEC there is a trend towards new industries, namely more labour skilled and technological intensive industries. Although the best performer, in this context, is the Czech Republic, changes have also occurred in Poland, Hungary, Slovakia and Slovenia. This differentiation points to a core-periphery structure across the CEEC, as perceived by GLIGOROV *et al.* (2003).

Furthermore, the methodologically achieved conclusions, as regards the gravity model calculations, allow us to present the Poisson Pseudo-Maximum Likelihood estimator (PML) as the best econometric tool to be applied in the analysis of international trade flows. Indeed, this estimator presents better results relatively to the alternative estimators calculated in this dissertation as regards to

either cross-section or panel data, namely pooled cross-section across time OLS, Fixed-Effects, Random-Effects, First-Differences and Instrumental Variables.

Additionally, the Poisson Pseudo-Maximum Likelihood estimator also avoids the problematic presence of heteroskedasticity or endogeneity as regards to the independant variables of the regression. Indeed, the PML was the only econometric tool that passed the relevant RESET robustness test, therefore, allowing us to conclude that it does not present any problem in terms of misspecification or omitted variables.

This dissertation also experimented, econometrically speaking, with alternatives to the usual GDP, distance and Trade Similatity Index variables, firstly proposed by LINNEMANN (1966), POLAK (1996) and FINGER & KREININ (1979), respectively. Both attempts yielded interesting results, but only the latter clearly outperformed the more classical set of variables.

As regards to the entire econometrical hypothesis experimented for the purpose of this dissertation, several were statistically considered significant, namely in terms of the estimation of the export and import equations of the gravity model for the EU25.

Firstly, the following variables were considered to positively influence foreign trade flows between the EU25 members during the 1999-2002 period. These include the TSI Index, reciprocal flow, exporter GDP, importer GDP, common language, euro sharing, German bias, importer population, adjacency, relative distance and exchange rate variables, following this order according to their pressure ability. Furthermore, we also concluded that other variables negatively influenced the EU25 internal trade flows during that same period, namely: absolute distance, exporting country landlockedness, exporting country size and exporting country population, being the order here present in accordance with their pressure ability.

Furthermore, the empirical results of our study allow us to conclude that the behaviour of bilateral trading flows related to the EU25 members follow the normal rules of gravitation. However, there are some specific and remarkable exceptions, which must be highlighted.

In this respect, the coefficients statistically obtained in the gravity model allowed us to construct a tentative list of countries that would benefit from the eastern enlargement. For that purpose, we make use of the already mentioned coefficients to calculate the potential trading flows involving two of the EU25 members from an in-sample projection approach. The residual of the respective estimated equation will be interpreted as the difference between potential and actual bilateral trade relations.

The conclusions obtained following this method pointed out to the fact that the situation in the threshold of the UE15 eastern enlargement is not favourable to the CC's role as EU25 Internal Market suppliers and, particularly, as CEEC suppliers. Note that, in specific terms, this enlargement specially injures both Spain and Ireland. This is not only the case in low-tech sectors, but also in more dynamic and technologically advanced sectors, where the CEEC are increasingly active as a result of actions taken by investors and large worldwide-operating multinationals.

In terms of blocs of countries, what we empirically found as regards to the CEEC exporting flows to the CC is that their potential level in 2002 was remarkably better (about 46.58%) than their current level in this same year according to the PML estimator. On the other hand, the CC exporting flows to the CEEC presented a slightly lower analogous potential level (about –6.81%) relatively to their current level. Therefore, at first sight, it can be expected that the dynamic process of enlargement will lead the CEEC to considerably increase their exports to the CC markets at the same time that the CC slightly decrease their exports to the CEEC.

Nevertheless, this global conclusion must be decomposed according to the several intervenient countries. Thus, the Greek potential exporting flows to the CEEC overcame the verified exporting flows in 2002 by 35.34% and the relation between the Portuguese potential and the verified exporting flows as regards to the CEEC achieved a remarkable 55.84%. Therefore, it can be concluded that the Portuguese exports still have a great leeway to grow within the CEEC market in the following years.

Turning now to the CEEC, it can be concluded that Latvia, the Czech Republic, Hungary, Romania, Poland and, mostly, Slovakia and Slovenia present potential exporting flows clearly higher than their actual trading flows to the CC observed in 2002. Consequently, their trading flows are expected to increase during the following years and, indeed, we identify an important potential of export growth towards the CC relatively to the current exporting flows as regards to these seven of the ten considered CEEC countries. However, Estonia, Bulgaria and Lithuania had already fulfilled all the potential trading flows in that same year and, therefore, statistically, their trading flows had no free space to grow, *ceteris paribus*.

In addition, an analysis of the role played either by the CC or the CEEC in the EU11 common market was also carried out. On one hand, it was observed that both the CEEC and the CC potential exporting flows towards the EU11 were slightly lower than the current trade in 2002. On the other hand, there existed considerable differences whether the EU11 exporting flows were linked to CEEC or CC markets. Whereas the EU11 exports towards the CEEC were expected to increase to match their potential extent, the EU11 exporting flows towards the CC were expected to decrease as a consequence of presenting a potential exporting size lower than the current flow.

To sum up, we point out several final statements regarding to the trade adjustment that we analysed throughout this dissertation, taking into consideration the net bilateral trading flows in manufactures and their implications on their respective manufacturing trade balances.

First and foremost, the remarkable difference observed between the verified and the potential trading balance involving both the CEEC and the CC must be highlighted. At this respect, it was observed that the actual manufacturing trade balance benefited the latter group of countries, whose trading surplus with the CEEC accounted for € 1 843 millions, whereas the potential manufacturing trade balance pointed out precisely on the other way, with the CEEC presenting a trading surplus that accounted for € 1 353 millions.

The comparison of the actual and the potential trade balances in manufactures for the year of 2002 emphasizes the above conclusions. Indeed, whereas the Irish and Spanish economies presented a large surplus in terms of their actual manufacturing trade balance, their respective potential manufacturing trade balances were statistically expected to present high deficits. Therefore, these two economies are expected to suffer the most with the eastern enlargement of the EU15, in trading terms. It must also be noted that the Greek case emerges as an analogous case to the latter, but in a minor scale.

On the contrary, the Portuguese verified trade deficit with the CEEC is expected to be remarkably reduced by taking into consideration its respective potential trade deficit. Indeed, whereas the verified flows accounted for € 201 millions of deficit on the Portuguese manufacturing trade balance, the potential flows summed up to just € 28 millions. Therefore, the calculations carried out in this dissertation allow us to state that Portugal is the only CC that is expected to improve its bilateral trade position with the CEEC in the threshold of the eastern enlargement of the EU15, mostly by improving its bilateral manufacturing trade balances with the Czech Republic, Poland and, in a minor scale, with the three Baltic countries.

Other adjustments

The eastern enlargement of the EU15 cannot be only approached from the viewpoint of the *trading adjustment* that it will cause. Indeed, several other adjustments must be taken also into account, which will allow, in turn, for a better understanding of the latter.

First of all, we must take into account the *adjustment via Structural and Cohesion Funds*, especially from 2007 henceforth. The competition borne by the so-called Cohesion Countries will be predictably materialised in the reduction of their access to the Cohesion Funds. Furthermore, fewer of their regions will have

the right to receive Objective I Structural Funds, admitting the maintenance of the current eligibility criteria[170].

A second necessary CC adjustment is related to the *freedom of movements of the productive factors*, namely capital and labour, a clear implication of the Single Market. On what concerns the *capital movement adjustment*, significantly high movements of capital are expected to occur from the old Member States to the new ones, hereby referred as the *FDI adjustment*. Indeed, the CEEC compete with the CC particularly in terms of attracting the global strategies of multinationals, which play a privileged role in supplying several kinds of crucial networks for manufactures and semi-manufactures industries.

This attraction of strategies materialises itself in inward FDI flows, which undoubtedly emerge as a source of innovation, employment and structural transformation in the benefited industrial sectors. Indeed, we can conclude that FDI flows stimulate trade by means of two powerful levers, namely technology and the investment strategies of large multinational companies.

Whereas free trade between the EU15 and the CEEC is gradually increasing and will predictably make a great leap forward after enlargement, free movement of FDI flows has been a reality since the signing of the Europe Agreements. As a consequence, the CEEC regions have shown a remarkable dynamism in this area and, over the last decade, the countries in the region have accumulated an appreciable stock of FDI in relation to their GDP that is substantially greater than that of the EU15 as a whole[171].

Moreover, EU11 companies are the source of almost 70% of this stock, with the largest proportion being in the hands of German and Dutch companies (19% and 14% of the total respectively). On the other hand, CC companies occupy an alarmingly low position in this ranking, in which only Ireland and Spain appear between the top-twenty[172]. A complete lack of strategy in the approach taken by CC companies seems to be the only explanation for this state of affairs.

[170] See Table III-11 for data about the current Structural and Cohesion Funds' distribution.
[171] See Table III-12.

These FDI flows, in search of competitive advantages, have reached economies that benefit from an attractive geographical location, in close proximity to the axis comprised of the Nordic countries, Germany and Northern Italy. This proximity can be considered to be the CEEC´s first comparative advantage against the CC. However, the importance of distance must not be exaggerated in the context of a dematerialised economy where transport unit costs are rapidly decreasing.

The second sub-adjustment in terms of *freedom of movements of the productive factors* is the *labour adjustment*. In fact, the CEEC still offer substantial and crucial advantages in terms of labour costs, as they are 11.5% of the EU15's[173]. Furthermore, they present human capital of superior quality in relation to that available in the CC, though it should be acknowledged that this component is difficult to measure and to compare with precision. As an example, it should be noted that the top-four EU25 countries that presented, in 2001, the higher percentage of population aged 25 to 64 having completed at least upper secondary education were CEEC, namely the Czech Republic, Estonia, Slovakia and Lithuania, whereas the four CC appeared on the last six positions[174].

Undeniably, this labour adjustment represents, in our view, a real danger for the CC, especially if they do not maintain and renew their non-locational advantages. Within this framework, authors such as MARTÍN *et al.* (2002, pp. 17) or, more recently, SAPIR *et al.* (2003, Part III) defended the importance of ensuring that both transport and communications networks are fully modernised, and that human and technological capital are brought up-to-date.

A third necessary CC adjustment is related to the flows expected to occur relatively to labour force, which are likely to occur in the opposite direction of the already mentioned capital flows. This phenomenon, hereby referred to as *migratory flows' adjustment*[175], is however assumed to be less significant than the capital flows' adjustment, partially due to their inherently inferior capacity of

[172] See Table III-13.
[173] See Table III-14.
[174] See Table III-15 and Table III-16.

movement and also to the varying-in-length restrictive temporary clauses established on the Accession Agreements. In fact, these restrictions are not to be dismantled before 2011, having, therefore, resulted into lower than expected current migration figures.

The figures also show that CEEC immigrants represented in 1999 less than 1% of the Spanish, Portuguese or Irish total immigrant population, in spite of representing more than 20% in Greece. However, they already represented approximately 15% of total EU15 immigration figures in the same year, particularly concentrated in Germany, Luxembourg and, mostly, Austria[176], due to their cultural and geographical proximity.

It should be also noted that the potential migration of highly-educated workers from the new Member States to the old ones, the so-called brain drain, would be extremely welcomed by the EU15 companies, as a factor of reduction of their labour costs. Unfortunately for these workers, there still exist strong handicaps to emigration, namely linguistic factors, lack of compatibility between the validation of university diplomas or even between Social Security systems, apart from the already referred restriction clauses stated in the Accession Agreements.

Moreover, the catching-up process in which the CEEC are embedded will certainly diminish their economic instability and, consequently, reduce the migration flows towards the other EU countries.

Final remarks

To sum up, the predictable balance of the EU recent enlargement does not seem to be much favourable for the Cohesion Countries, with the only feasible exception being the virtual and partial positive effects over both employment and the EU Internal Market broadening, observed from the restrictive viewpoint of a partial international trade model. Within this approach, we statistically proved

[175] For an excellent and broad reference table of studies related to the estimation of the effects of potential migratory flows from the CEEC to the EU see MARTÍN *et al.* (2002, pp. 106).
[176] See MARTÍN *et al.* (2002, pp. 103).

throughout this dissertation that the trading adjustment in the case of the Greek and, moreover, Portuguese exports to the CEEC represent latent opportunities of conquering new market shares that have not been seized at this moment.

On the contrary, this fact has also been approached in the final conclusion of the several simulations carried out by MARTÍN *et al.* (2002) as regards the developments of the Spanish Economy in an enlarged European Union from the viewpoint of a general international trade model. These authors concluded as a final remark (pp. 19) that "*trade adjustment and the partial redirection of FDI are likely to result for Spain in a fall of employment and in aggregate production, particularly in manufacturing*". As we proved throughout this dissertation, these conclusions remain valid in the Irish case from the viewpoint of a partial international trade model.

Indeed, these authors carried out several simulations in different scenarios and estimated that the Spanish output for 2007 will be nearly 2% lower than would otherwise have been, as a consequence of the four adjustments referred above (for 2013 the reduction is estimated as achieving 1%). According to their analysis, this reduction is likely to be accompanied by a significant reduction in prices and wages, and an increase in the unemployment rate of approximately one percentage point with respect to its level in the baseline model simulation used for the analysis.

ANNEXES

III.1 Data Appendix

III.1.1 Definitions of Variables

Dependant Variables:

M - *Nominal Importing c.i.f. Manufacturing Flows*[177] (covering Comext's 2-digit CN yearly data from 1999 to 2002), measured in thousands of euro.

X - *Nominal Exporting f.o.b. Manufacturing Flows*[178] (covering Comext's 2-digit CN yearly data from 1999 to 2002), measured in thousands of euro.

Independant Variables:

DIST - *Absolute Distance*, expressed in kilometres, is the geodesic (great circle) distance between capitals (except in the case of The Netherlands, where Amsterdam substitutes Den Haag), measured as the surface distance between two points of latitude and longitude. Values obtained from *www.wcrl.ars.usda.gov/cec/java/lat-long.htm*.

MGDP - *Importing Country's Nominal Gross Domestic Product at Market Prices*, expressed in thousands of euro. Yearly data obtained from the Eurostat's *New Cronos* Database on November 24th, 2003.

XGDP - *Exporting Country's Nominal Gross Domestic Product at Market Prices*, expressed in thousands of euro. Yearly data obtained from the Eurostat's *New Cronos* Database on November 24th, 2003.

MGDPPC - *Importing Country's Nominal Gross Domestic Product per capita at Market Prices*, expressed in euro. Yearly data obtained accordingly to Authors' calculations.

XGDPPC - *Exporting Country's Nominal Gross Domestic Product per capita at Market Prices*, expressed in euro. Yearly data obtained accordingly to Authors' calculations.

MPOP - *Importing Country's Population*, expressed in thousands of people at the end of the period. Data obtained from the Eurostat's *New Cronos* Database on November 24th, 2003.

XPOP - *Exporting Country's Population*, expressed in thousands of people at the end of the period. Data obtained from the Eurostat's *New Cronos* Database on November 24th, 2003.

[177] Codes 16 to 98.
[178] *Idem.*

NEIGH - *Neighbouring Dummy Variable* is equal to 1 if two trading partners share a land or sea border, 0 otherwise. From the CIA's *The World Factbook 2003* on *www.cia.gov/cia/publications/factbook/index.html*.

IDIOM - *Common Language Dummy Variable* is equal to 1 if two trading partners share a same official language, 0 otherwise. From the CIA's *The World Factbook 2003* on *www.cia.gov/cia/publications/factbook/index.html*.

ETHN - *Ethnic Dummy Variable* is equal to 1 if there is an ethnic minority representing more than 5% of total population, 0 otherwise. From the CIA's *The World Factbook 2003*.

COS - *COS Variable* varies from 0 to 1 as a similarity measure of trading structures. Authors' calculations based on the *European Commission's Comext Database* (covering manufacturing 6-digit CN yearly data from 1999 to 2002).

EIS - *EIS Variable* varies from 0 to 1 as a similarity measure of trading structures. Authors' calculations based on the *European Commission's Comext Database* (covering manufacturing 6-digit CN yearly data from 1999 to 2002).

EU15 - *EU15 Dummy Variable* is equal to 1 if both of the countries involved in the trading flow belong to the EU15, 0 otherwise.

EURO - *Euro Dummy Variable* is equal to 1 if both countries involved in the trading flow share the euro as a common currency, 0 otherwise.

RDIST - *Relative Distance*, expressed in kilometres, is the geodesic (great circle) distance between the midpoint of each trading-country pair and the European Trade Centre (ETC) for each considered year, according to SMARZYSNKA JAVORCIK (2001).

MLAND - *Importing Country's Land Area*, expressed in squared kilometres. From the CIA's *The World Factbook 2003*.

XLAND - *Exporting Country's Land Area*, expressed in squared kilometres. From the CIA's *The World Factbook 2003*.

INEQ - *Inequality of Nominal Gross Domestic Products per capita at Market Prices*, expressed in euro. Yearly data obtained accordingly to Authors' calculations based on the Eurostat's *New Cronos* Database on November 24th, 2003.

EXR - *Nominal Bilateral Exchange Rate*. Data obtained accordingly to Authors' calculations based on yearly averages for the course of exchange of the exporting country's currency against the euro divided by the course of exchange of the importing country's currency also against the euro. Those courses of exchange previously obtained from Eurostat's *New Cronos* Database on November 24th, 2003.

MFER - *Importing Country's Foreign Exchange Reserves*, expressed in millions of euro. Yearly data obtained at the end of the period accordingly to Eurostat's *New Cronos* Database on November 24th, 2003.

XFER - *Importing Country's Foreign Exchange Reserves*, expressed in millions of euro. Yearly data obtained at the end of the period accordingly to Eurostat's *New Cronos* Database on November 24th, 2003.

RECI - *Reciprocity*, defined as the opposite trading flow of the dependant variable (covering yearly data from the Comext's 2-digit CN from 1999 to 2002), measured in thousands of euro.

GERMAN - *German Dummy Variable*, is equal to 1 if one of the countries involved in the trading flow is Germany, 0 otherwise.

MLOCK - *Landlockedness Dummy Variable for the Importing Country*, is equal to 1 if the importing country has no direct connection to sea, 0 otherwise.

XLOCK - *Landlockedness Dummy Variable for the Exporting Country*, is equal to 1 if the exporting country has no direct connection to sea, 0 otherwise.

Please, note that an L might precede these variables throughout the dissertation, indicating that the logarithm has been applied to the variable in question.

III.1.2 Countries Included in the Data Set

Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands (The), Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

III.2 Tables

Table III-1 – Gross Domestic Product *per capita* measured either at current market prices or at PPP, for 2002

Euro per inhabitant	2002
Luxembourg	50190
Denmark	34060
Ireland	33090
Sweden	28650
Utd. Kingdom	28010
Netherlands	27540
Austria	27110
Finland	26860
Germany	25590
Belgium	25170
France	24840
Italy f	21690
Spain	17170
Greece	12910
Portugal	12470
Slovenia	11700
Czech Rep.	7660
Hungary	6780
Poland	5230
Estonia	5080
Slovakia	4770
Lithuania	4230
Latvia	3820
Romania	2230
Bulgaria	2110

PPS per inhabitant	2002
Luxembourg f	45430
Ireland f	30180
Denmark f	27020
Netherlands f	26810
Austria f	26690
Utd. Kingdom f	25830
Belgium f	25620
France f	25160
Sweden f	25150
Finland f	24480
Germany f	23960
Italy f	23630
Spain f	20710
Greece f	17040
Portugal f	17010
Slovenia f	16600
Czech Rep. f	14880
Hungary f	12840
Slovakia f	11330
Poland f	9910
Estonia f	9660
Lithuania f	9410
Latvia f	8380
Romania f	6390
Bulgaria	6360

Source: European Commission's New Cronos Database – f: forecast

Table III-2 - Trade Relationship between CEEC and EU15, sorted by 2-digit Comext's CN (in thousands of euro)

CEEC Exports to EU15					CEEC Imports from EU15					X+M				
	1999	2000	2001	2002		1999	2000	2001	2002		1999	2000	2001	2002
TT	**75.988.860**	**97.857.474**	**111.487.471**	**119.003.608**	**TT**	**91.905.577**	**113.345.950**	**124.860.976**	**132.848.843**	**TT**	**167.894.436**	**211.203.424**	**236.348.447**	**251.852.451**
85	10.293.764	15.172.880	17.892.267	18.618.886	84	17.252.887	20.613.021	22.740.127	23.763.170	84	27.702.580	34.363.837	38.745.891	41.634.309
84	10.449.693	13.750.816	16.005.764	17.871.139	87	11.258.166	14.298.221	16.094.643	18.464.447	85	23.836.278	33.423.133	36.837.667	36.941.998
87	9.507.767	12.091.497	13.609.911	15.364.874	85	13.542.514	18.250.253	18.945.399	18.323.112	87	20.765.933	26.389.718	29.704.554	33.829.321
62	5.481.809	6.028.662	6.902.253	6.875.305	39	4.982.799	6.277.380	6.875.791	7.560.449	39	6.698.356	8.730.013	9.372.613	10.210.657
94	4.232.761	5.193.281	6.002.637	6.671.516	30	2.295.399	2.777.275	3.736.949	4.207.713	94	5.749.095	6.851.956	7.757.548	8.502.426
44	3.721.927	4.212.062	4.116.932	4.342.874	48	2.578.803	3.172.381	3.500.550	3.750.103	62	6.554.125	7.188.693	8.235.914	8.351.666
27	2.149.943	3.294.127	4.231.413	4.338.517	73	2.483.358	2.952.863	3.301.205	3.614.866	73	5.225.032	6.278.411	7.119.361	7.451.959
73	2.741.674	3.325.548	3.818.156	3.837.093	90	2.208.674	2.787.133	3.095.668	3.225.163	27	3.699.151	5.350.189	6.081.642	6.058.778
72	2.184.205	3.040.083	3.101.861	2.870.428	72	1.697.079	2.394.663	2.648.095	2.767.757	72	3.881.284	5.434.745	5.749.956	5.638.185
39	1.715.557	2.452.633	2.496.823	2.650.208	38	1.434.898	1.615.232	1.773.708	1.959.394	48	3.575.605	4.533.928	5.198.181	5.589.184
61	1.970.447	2.325.979	2.698.718	2.649.458	94	1.516.334	1.658.676	1.754.911	1.830.910	44	4.429.098	5.027.845	5.012.764	5.366.448
64	1.656.093	1.928.512	2.351.757	2.471.868	32	1.304.671	1.528.779	1.634.728	1.800.889	90	3.017.322	3.887.577	4.557.260	4.938.449
40	1.189.660	1.511.762	1.815.868	2.188.241	27	1.549.208	2.056.062	1.850.229	1.720.261	30	2.433.425	2.943.796	3.924.037	4.456.940
76	1.420.529	2.037.636	2.173.857	2.166.566	40	1.036.975	1.277.332	1.411.421	1.634.462	61	2.889.229	3.342.717	3.918.172	3.920.474
48	996.802	1.361.546	1.697.631	1.839.081	76	1.066.909	1.340.408	1.512.159	1.592.210	40	2.226.635	2.789.095	3.227.289	3.822.703
90	808.648	1.100.444	1.461.592	1.713.286	52	999.686	1.246.912	1.448.935	1.521.555	76	2.487.438	3.378.044	3.686.016	3.758.776
29	896.767	1.270.357	1.599.157	1.628.416	41	882.736	1.095.135	1.389.787	1.506.793	64	2.434.788	2.857.831	3.490.922	3.687.334
70	886.083	1.037.360	1.153.375	1.229.723	62	1.072.315	1.160.030	1.333.661	1.476.360	29	1.746.568	2.435.115	2.783.159	2.954.514
74	782.531	1.247.207	958.041	977.622	83	889.065	1.069.971	1.234.476	1.369.631	70	1.493.501	1.748.281	1.993.676	2.252.629
63	672.513	796.883	903.600	898.483	33	967.368	1.103.929	1.224.596	1.363.335	38	1.587.377	1.778.496	1.967.983	2.171.281
83	430.327	560.830	676.805	797.233	55	1.198.826	1.308.983	1.388.778	1.348.874	83	1.319.392	1.630.801	1.911.281	2.166.864
86	486.742	611.832	753.102	784.345	29	849.801	1.164.758	1.184.002	1.326.098	32	1.444.669	1.695.510	1.809.682	1.995.260
95	320.744	389.078	477.421	737.649	61	918.782	1.016.738	1.219.453	1.271.016	52	1.313.265	1.615.528	1.868.275	1.948.709
71	452.434	550.968	579.011	710.204	54	980.811	1.176.713	1.314.663	1.262.956	41	1.134.242	1.429.909	1.778.909	1.880.044
2	485.956	538.774	683.109	623.249	64	778.696	929.319	1.139.165	1.215.466	54	1.372.779	1.675.131	1.857.865	1.833.012
99	503.766	621.239	674.285	620.477	44	707.171	815.783	895.832	1.023.574	55	1.396.102	1.543.732	1.654.501	1.622.480
89	523.570	447.019	398.595	593.739	70	607.419	710.921	840.302	1.022.906	74	1.163.225	1.817.120	1.565.893	1.601.263
69	476.134	559.941	622.764	587.025	59	652.849	833.346	933.559	963.741	33	1.057.352	1.236.518	1.376.575	1.593.004
54	391.968	498.418	543.202	570.056	51	755.354	868.469	949.701	910.157	95	681.142	824.074	980.708	1.322.696
49	267.460	381.889	424.817	563.679	82	498.830	608.988	734.978	789.976	69	1.113.901	1.250.020	1.375.807	1.308.926
31	396.355	669.677	600.776	482.051	60	621.310	735.108	748.331	756.448	49	777.043	973.785	1.071.807	1.300.051
28	401.608	471.845	498.012	445.387	23	517.297	604.699	678.911	755.363	63	942.978	1.079.334	1.228.416	1.254.703
52	313.579	368.616	419.340	427.154	49	509.582	591.896	646.989	736.372	51	909.063	1.092.855	1.236.076	1.222.493
12	405.385	346.500	376.949	424.815	69	637.767	690.079	753.043	721.901	82	720.950	896.907	1.102.411	1.178.168
68	318.480	376.251	403.146	421.150	34	511.817	571.077	618.042	669.276	86	741.656	971.659	1.097.070	1.167.490
10	112.966	111.960	133.508	407.534	8	488.985	578.745	657.083	640.743	2	657.408	863.732	1.112.847	1.116.797
7	276.177	280.582	399.815	395.651	68	516.059	567.916	605.585	632.679	59	723.204	938.879	1.056.748	1.094.001
20	255.149	314.891	367.124	394.969	74	380.694	569.913	607.852	623.641	68	834.539	944.168	1.008.731	1.053.829
82	222.120	287.919	367.434	388.191	88	284.703	209.390	317.246	609.794	99	798.815	928.573	1.020.767	1.029.139
42	217.158	288.433	365.199	382.450	95	360.398	434.996	503.287	585.047	23	669.171	812.185	945.133	1.027.918
41	251.506	334.774	389.122	373.251	21	416.826	463.513	529.170	548.818	8	857.868	973.298	1.025.249	1.002.136
8	368.883	394.552	368.167	361.394	58	351.235	396.559	436.651	534.554	28	783.622	919.623	981.055	941.497
4	176.872	198.279	316.701	319.972	28	382.014	447.778	483.043	496.110	71	650.718	788.084	829.701	934.061
51	153.709	224.386	286.375	312.336	2	171.452	324.959	429.737	493.548	88	360.292	315.169	580.103	884.396
1	264.201	278.294	328.510	298.060	56	320.199	387.291	446.089	462.966	34	609.916	694.355	787.469	881.766
25	357.443	339.451	333.834	285.477	15	298.990	280.836	344.614	444.785	89	595.256	581.413	503.734	866.734
22	242.636	271.823	273.314	275.480	99	295.049	307.335	346.482	408.662	60	664.829	788.388	803.797	806.807
88	75.589	105.779	262.857	274.602	35	276.671	308.703	363.961	406.736	7	509.458	549.912	710.114	762.638
55	197.277	234.749	265.724	273.606	22	311.690	338.789	376.202	406.039	42	372.421	508.743	659.594	693.808
23	151.874	207.486	266.222	272.555	96	342.722	371.156	393.686	401.669	22	554.327	610.612	649.516	681.519
30	138.026	166.521	187.087	249.226	86	254.914	359.826	343.968	383.145	56	413.272	518.684	604.442	642.348
33	89.984	132.588	151.979	229.669	7	233.281	269.329	310.299	366.987	58	423.086	476.317	531.452	632.320
16	174.001	184.156	190.996	213.596	37	250.568	322.632	374.757	365.244	20	426.114	503.794	573.303	620.823
34	98.099	123.277	169.426	212.490	63	270.464	282.451	324.816	356.220	21	436.415	492.765	581.295	615.764
38	152.479	163.263	194.275	211.886	42	155.263	220.309	294.395	311.358	96	481.215	541.765	567.109	588.666
3	214.535	218.728	222.650	201.349	18	204.672	221.425	262.823	300.589	31	469.803	747.019	692.297	575.400

Source: European Commission's Comext Database

For methodological purposes, whereas the Comext Database defines the exports' statistical value as the value of the goods at the place and time that they left the statistical territory of the exporting Member State, it defines as imports' statistical value the value of the goods at the place and time that they enter the statistical territory of the importing Member State.
Therefore, throughout this paper the values referring to exports are FOB (Free on Board) values, whereas the figures referring to imports are CIF (Cost, Insurance and Freight) values.

Table III-3 – Share of each one of the Central and Eastern European Countries within the CEEC total trade flows related to the EU15

CEEC Exports to EU15					CEEC Imports from EU15				
	1999	2000	2001	2002		1999	2000	2001	2002
Poland	**23,01%**	**23,72%**	**23,79%**	**23,66%**	Poland	**30,91%**	**29,26%**	**28,06%**	**27,74%**
Czech Republic	22,04%	22,02%	22,47%	23,09%	Czech Republic	19,67%	20,72%	21,60%	21,44%
Hungary	23,14%	22,49%	22,24%	21,20%	Hungary	19,75%	19,93%	18,79%	18,64%
Romania	7,59%	7,81%	8,40%	8,73%	Romania	6,81%	7,63%	8,35%	8,55%
Slovakia	7,84%	7,09%	7,31%	8,16%	Slovakia	5,93%	5,76%	6,31%	6,53%
Slovenia	6,95%	6,34%	5,87%	5,72%	Slovenia	7,42%	7,09%	6,69%	6,45%
Bulgaria	2,96%	3,14%	3,13%	3,03%	Bulgaria	2,90%	2,82%	3,19%	3,14%
Estonia	2,49%	3,24%	2,72%	2,49%	Lithuania	2,23%	2,22%	2,69%	2,98%
Lithuania	2,13%	2,21%	2,35%	2,28%	Estonia	2,60%	2,80%	2,41%	2,62%
Latvia	**1,85%**	**1,94%**	**1,71%**	**1,63%**	Latvia	**1,78%**	**1,75%**	**1,92%**	**1,91%**
	100,00%	100,00%	100,00%	100,00%		100,00%	100,00%	100,00%	100,00%

Source: European Commission's Comext Database.

Note: The values in red indicate a decreasing relative trend regarding the previous year. The values in **bold** represent the highest and the lowest values alike.

Table III-4 – Detailed External Trade of the CEEC (2002)

A. CEEC Main Traded Products with the CC (2-digit Comext´s CN)

CEEC IMPORTS FROM THE CC (2002)						
(Mio. Euro)	(%)	Code	Ireland	Greece	Portugal	Spain
6.639	**100,00%**					
1.396	21,03%	87	0,08%	1,02%	3,07%	**95,83%**
984	14,82%	84	**32,40%**	6,73%	6,86%	**54,01%**
841	12,66%	85	**26,17%**	13,00%	9,72%	**51,11%**
366	5,51%	08	0,00%	**35,64%**	0,01%	**64,35%**
246	3,70%	39	7,91%	**31,25%**	3,49%	**57,35%**
210	3,16%	61	1,13%	**82,36%**	4,46%	12,05%
149	2,25%	30	**40,28%**	6,13%	7,82%	**45,77%**
131	1,98%	69	0,01%	3,14%	4,21%	**92,64%**
120	1,81%	73	3,91%	21,33%	8,86%	**65,89%**
116	1,74%	07	0,01%	4,81%	0,02%	**95,16%**
106	1,60%	33	**38,10%**	**22,41%**	1,51%	**37,98%**
98	1,48%	52	1,49%	**44,37%**	19,02%	**35,13%**

CEEC EXPORTS TO THE CC (2002)												
(Mio. Euro)	(%)	Code	Estonia	Latvia	Lithuania	Poland	Czech R.	Slovakia	Hungary	Romania	Bulgaria	Slovenia
5.165	**100,00%**											
1.114	21,57%	84	0,20%	0,05%	0,47%	**45,43%**	13,78%	2,85%	**32,76%**	1,13%	1,44%	1,89%
827	16,02%	85	0,20%	0,04%	1,35%	**24,26%**	17,57%	13,91%	**32,06%**	6,37%	0,90%	3,33%
748	14,48%	87	1,20%	0,09%	0,04%	18,56%	**63,12%**	3,28%	8,91%	0,14%	0,17%	4,49%
464	8,99%	27	12,41%	4,89%	31,69%	11,51%	0,47%	0,54%	0,55%	**28,49%**	9,45%	0,00%
213	4,13%	44	7,77%	9,73%	0,72%	18,79%	7,89%	6,80%	9,04%	**21,61%**	14,89%	2,77%
199	3,85%	72	0,37%	4,49%	1,80%	5,32%	15,60%	11,54%	2,94%	**21,84%**	**32,81%**	3,30%
153	2,97%	40	0,01%	0,00%	0,00%	**31,63%**	**36,01%**	6,28%	12,47%	2,61%	2,34%	8,65%
100	1,93%	73	0,02%	0,03%	0,03%	**26,97%**	**35,64%**	6,67%	7,41%	8,64%	9,76%	4,85%
96	1,85%	76	0,95%	0,00%	0,02%	5,31%	2,45%	0,36%	3,06%	**69,54%**	13,59%	4,71%
86	1,67%	39	0,06%	0,10%	0,01%	12,31%	**20,81%**	2,66%	**28,60%**	13,16%	**20,02%**	2,27%
81	1,57%	94	13,73%	0,24%	1,13%	**35,00%**	12,71%	2,06%	2,74%	15,40%	10,75%	6,25%
76	1,47%	10	1,50%	2,21%	6,54%	5,77%	0,00%	0,03%	**23,75%**	13,08%	**47,11%**	0,00%

Source: European Commission's Comext Database.

B. Central and Eastern European Countries Main Partners

IMPORTS				EXPORTS				IMPORTS+EXPORTS			
Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World
CEEC : TRADE WITH MAIN PARTNERS IN 2002 (Mio euro)											
	WORLD	**193.285**	***100,00%***		**WORLD**	**157.150**	***100,00%***		**WORLD**	**350.449**	***100,00%***
1	Fr Germany	56.425	*29,19%*	1	Fr Germany	53.757	*34,21%*	1	Fr Germany	110.183	*31,44%*
2	Italy	17.639	*9,13%*	2	Italy	13.488	*8,58%*	2	Italy	31.127	*8,88%*
3	Russia	17.452	*9,03%*	3	Austria	11.057	*7,04%*	3	Austria	21.935	*6,26%*
4	France	11.912	*6,16%*	4	Utd. Kingdom	8.618	*5,48%*	4	Russia	21.173	*6,04%*
5	Austria	10.879	*5,63%*	5	France	8.548	*5,44%*	5	France	20.461	*5,84%*
6	Netherlands	7.468	*3,86%*	6	USA	6.279	*4,00%*	6	Utd. Kingdom	15.420	*4,40%*
7	Utd. Kingdom	6.802	*3,52%*	7	Netherlands	5.267	*3,35%*	7	Netherlands	12.735	*3,63%*
8	China	6.309	*3,26%*	8	Belgium	4.579	*2,91%*	8	USA	11.319	*3,23%*
9	Belgium	5.710	*2,95%*	9	Russia	3.721	*2,37%*	9	Belgium	10.290	*2,94%*
10	USA	5.039	*2,61%*	10	Sweden	3.609	*2,30%*	10	Spain	7.392	*2,11%*
11	Spain	4.191	*2,17%*	11	Spain	3.201	*2,04%*	11	Sweden	7.316	*2,09%*
12	Sweden	3.707	*1,92%*	12	Ukraine	2.378	*1,51%*	12	China	6.988	*1,99%*
13	Finland	3.407	*1,76%*	13	Denmark	2.227	*1,42%*	13	Finland	5.264	*1,50%*
14	Japan	3.373	*1,74%*	14	Turkey	1.885	*1,20%*	14	Ukraine	4.833	*1,38%*
15	Switzerland	2.762	*1,43%*	15	Finland	1.857	*1,18%*	15	Switzerland	4.459	*1,27%*
16	Ukraine	2.438	*1,26%*	16	Switzerland	1.697	*1,08%*	16	Denmark	4.212	*1,20%*
17	Turkey	2.134	*1,10%*	17	Croatia	1.630	*1,04%*	17	Japan	4.064	*1,16%*
18	Denmark	1.985	*1,03%*	18	Norway	1.466	*0,93%*	18	Turkey	4.001	*1,14%*
19	South Korea	1.766	*0,91%*	19	Greece	1.224	*0,78%*	19	Norway	2.495	*0,71%*
20	Greece	1.202	*0,62%*	20	Portugal	822	*0,52%*	20	Greece	2.427	*0,69%*
21	Malaysia	1.164	*0,60%*	21	Serb.Monten.	736	*0,47%*	21	Croatia	2.124	*0,61%*
22	Norway	1.119	*0,58%*	22	Bosnia-Herz.	708	*0,45%*	22	South Korea	2.018	*0,58%*
23	Brazil	895	*0,46%*	23	China	617	*0,39%*	23	Ireland	1.341	*0,38%*
24	Ireland	841	*0,44%*	24	Japan	577	*0,37%*	24	Portugal	1.190	*0,34%*
25	Singapore	809	*0,42%*	25	Belarus	540	*0,34%*	25	Belarus	1.106	*0,32%*
26	Belarus	600	*0,31%*	26	Canada	532	*0,34%*	26	Brazil	1.049	*0,30%*
27	Croatia	491	*0,25%*	27	Ireland	494	*0,31%*	27	Malaysia	858	*0,24%*
28	Indonesia	470	*0,24%*	28	For.JRep.Mac	271	*0,17%*	28	Serb.Monten.	763	*0,22%*
29	Philippines	460	*0,24%*	29	Egypt	260	*0,17%*	29	Canada	610	*0,17%*
30	Thailand	436	*0,23%*	30	Luxembourg	212	*0,14%*	30	Singapore	609	*0,17%*
31	Portugal	397	*0,21%*	31	Israel	182	*0,12%*	31	Hong Kong	533	*0,15%*
32	Hong Kong	227	*0,12%*	32	India	148	*0,09%*	32	Bosnia-Herz.	526	*0,15%*
33	Israel	219	*0,11%*	33	Moldova	140	*0,09%*	33	Philippines	503	*0,14%*
34	Algeria	218	*0,11%*	34	South Korea	128	*0,08%*	34	Israel	374	*0,11%*
35	Kasakhstan	196	*0,10%*	35	Mexico	126	*0,08%*	35	For.JRep.Mac	319	*0,09%*
36	India	168	*0,09%*	36	Singapore	119	*0,08%*	36	Luxembourg	298	*0,09%*
37	Luxembourg	131	*0,07%*	37	Australia	118	*0,07%*	37	India	286	*0,08%*
38	Ivory Coast	71	*0,04%*	38	Brazil	106	*0,07%*	38	Algeria	285	*0,08%*
39	Bosnia-Herz.	66	*0,03%*	39	U.A.Emirates	106	*0,07%*	39	Kasakhstan	226	*0,06%*
40	Turkmenistan	60	*0,03%*	40	Iceland	85	*0,05%*	40	Egypt	198	*0,06%*
	EU15	**132.697**	***68,65%***		**EU15**	**118.960**	***75,70%***		**EU15**	**251.657**	***71,81%***
	CC	**6.631**	***3,43%***		**CC**	**5.740**	***3,65%***		**CC**	**12.371**	***3,53%***
(a)	NAFTA	5.763	***2,98%***	(a)	NAFTA	7.105	***4,52%***	(a)	NAFTA	12.868	***3,67%***
(b)	AMLAT	2.228	***1,15%***	(b)	AMLAT	967	***0,62%***	(b)	AMLAT	3.195	***0,91%***
(d)	EFTA	4.105	***2,12%***	(d)	EFTA	3.405	***2,17%***	(d)	EFTA	7.510	***2,14%***
(e)	MED	2.068	***1,07%***	(e)	MED	1.471	***0,94%***	(e)	MED	3.539	***1,01%***
(f)	ASEAN	3.404	***1,76%***	(f)	ASEAN	948	***0,60%***	(f)	ASEAN	4.352	***1,24%***

Source: European Commission's Comext Database.

C. Bulgaria Main Partners

IMPORTS				EXPORTS				IMPORTS+EXPORTS			
Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World
BULGARIA : TRADE WITH MAIN PARTNERS IN 2002 (Mio euro)											
	WORLD	**8.411**	***100,00%***		**WORLD**	**6.063**	***100,00%***		**WORLD**	**14.474**	***100,00%***
1	Russia	1.206	*14,33%*	1	Italy	973	*16,05%*	1	Fr Germany	1.856	*12,83%*
2	Fr Germany	1.157	*13,76%*	2	Fr Germany	699	*11,53%*	2	Italy	1.825	*12,61%*
3	Italy	851	*10,12%*	3	Turkey	532	*8,77%*	3	Russia	1.301	*8,99%*
4	Greece	586	*6,97%*	4	Utd. Kingdom	372	*6,13%*	4	Turkey	925	*6,39%*
5	France	430	*5,11%*	5	Greece	329	*5,43%*	5	Greece	915	*6,32%*
6	Turkey	393	*4,67%*	6	France	325	*5,36%*	6	France	755	*5,21%*
7	Austria	274	*3,26%*	7	Belgium	322	*5,30%*	7	Utd. Kingdom	582	*4,02%*
8	Ukraine	239	*2,84%*	8	USA	272	*4,49%*	8	Belgium	468	*3,23%*
9	Utd. Kingdom	211	*2,51%*	9	Spain	222	*3,66%*	9	USA	433	*2,99%*
10	Netherlands	193	*2,29%*	10	Serb.Monten.	176	*2,90%*	10	Austria	405	*2,79%*
11	Romania	186	*2,21%*	11	Romania	156	*2,57%*	11	Spain	362	*2,50%*
12	USA	161	*1,91%*	12	For.JRep.Mac	130	*2,15%*	12	Romania	342	*2,36%*
13	Belgium	146	*1,74%*	13	Austria	130	*2,15%*	13	Netherlands	319	*2,21%*
14	Spain	139	*1,66%*	14	Netherlands	126	*2,09%*	14	Ukraine	294	*2,03%*
15	China	136	*1,62%*	15	Switzerland	99	*1,64%*	15	Serb.Monten.	200	*1,38%*
16	Hungary	134	*1,59%*	16	Russia	95	*1,57%*	16	Switzerland	200	*1,38%*
17	Czech Republic	124	*1,47%*	17	Poland	65	*1,08%*	17	Hungary	182	*1,26%*
18	Switzerland	101	*1,20%*	18	Ukraine	55	*0,91%*	18	Czech Republic	165	*1,14%*
19	Japan	89	*1,06%*	19	Georgia	49	*0,82%*	19	Poland	153	*1,06%*
20	Poland	87	*1,04%*	20	Hungary	49	*0,80%*	20	For.JRep.Mac	149	*1,03%*
21	Indonesia	69	*0,82%*	21	Israel	43	*0,70%*	21	China	148	*1,03%*
22	Denmark	57	*0,68%*	22	Czech Republic	41	*0,67%*	22	Japan	100	*0,69%*
23	Brazil	54	*0,64%*	23	Albania	40	*0,65%*	23	Denmark	86	*0,59%*
24	Sweden	48	*0,57%*	24	Slovenia	36	*0,60%*	24	Sweden	81	*0,56%*
25	South Korea	48	*0,57%*	25	Sweden	33	*0,54%*	25	Slovenia	78	*0,54%*
26	Slovakia	43	*0,51%*	26	Denmark	29	*0,48%*	26	Indonesia	72	*0,50%*
27	Slovenia	42	*0,50%*	27	Cyprus	28	*0,46%*	27	Brazil	69	*0,48%*
28	Chile	33	*0,39%*	28	Algeria	27	*0,45%*	28	Israel	62	*0,43%*
29	Peru	33	*0,39%*	29	Egypt	27	*0,44%*	29	South Korea	59	*0,41%*
30	Finland	32	*0,38%*	30	Portugal	26	*0,44%*	30	Georgia	58	*0,40%*
31	Canada	26	*0,31%*	31	Canada	25	*0,41%*	31	Slovakia	55	*0,38%*
32	Portugal	19	*0,23%*	32	Lithuania	15	*0,25%*	32	Portugal	46	*0,32%*
33	Ireland	18	*0,21%*	33	Slovakia	12	*0,20%*	33	Finland	42	*0,29%*
34	Luxembourg	8	*0,10%*	34	Finland	10	*0,17%*	34	Ireland	24	*0,17%*
35	Lithuania	5	*0,06%*	35	Latvia	9	*0,15%*	35	Lithuania	20	*0,14%*
	EU25	**4.791**	***56,96%***		**EU25**	**3.980**	***65,65%***		**EU25**	**8.771**	***60,60%***
	EU15	**4.170**	***49,58%***		**EU15**	**3.597**	***59,33%***		**EU15**	**7.767**	***53,66%***
	CC	**763**	***9,07%***		**CC**	**578**	***9,53%***		**CC**	**1.340**	***9,26%***
(a)	NAFTA	192	***2,28%***	(a)	NAFTA	319	***5,26%***	(a)	NAFTA	511	***3,53%***
(b)	AMLAT	167	***1,99%***	(b)	AMLAT	62	***1,03%***	(b)	AMLAT	230	***1,59%***
(c)	CANDIDATES	433	***5,15%***	(c)	CANDIDATES	195	***3,22%***	(c)	CANDIDATES	629	***4,34%***
(d)	EFTA	108	***1,28%***	(d)	EFTA	106	***1,76%***	(d)	EFTA	214	***1,48%***
(e)	MED	52	***0,62%***	(e)	MED	151	***2,49%***	(e)	MED	203	***1,40%***
(f)	ASEAN	129	***1,53%***	(f)	ASEAN	23	***0,39%***	(f)	ASEAN	152	***1,05%***

Source: European Commission's Comext Database.

D. Czech Republic Main Partners

IMPORTS				EXPORTS				IMPORTS+EXPORTS			
Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World
CZECH REPUBLIC : TRADE WITH MAIN PARTNERS IN 2002 (Mio euro)											
	WORLD	**43.005**	***100,00%***		**WORLD**	**40.682**	***100,00%***		**WORLD**	**83.687**	***100,00%***
1	Fr Germany	15.575	*36,22%*	1	Fr Germany	16.152	*39,70%*	1	Fr Germany	31.728	*37,91%*
2	Slovakia	2.302	*5,35%*	2	Slovakia	2.673	*6,57%*	2	Slovakia	4.975	*5,94%*
3	Austria	2.225	*5,17%*	3	Austria	2.294	*5,64%*	3	Austria	4.519	*5,40%*
4	France	2.147	*4,99%*	4	Utd. Kingdom	1.989	*4,89%*	4	France	3.739	*4,47%*
5	Italy	2.140	*4,98%*	5	Poland	1.903	*4,68%*	5	Italy	3.678	*4,39%*
6	Poland	1.737	*4,04%*	6	France	1.592	*3,91%*	6	Poland	3.639	*4,35%*
7	Russia	1.692	*3,93%*	7	Italy	1.538	*3,78%*	7	Utd. Kingdom	3.606	*4,31%*
8	Utd. Kingdom	1.617	*3,76%*	8	USA	1.243	*3,06%*	8	Netherlands	2.458	*2,94%*
9	Netherlands	1.504	*3,50%*	9	Netherlands	954	*2,35%*	9	Russia	2.247	*2,69%*
10	Belgium	1.234	*2,87%*	10	Hungary	922	*2,27%*	10	USA	2.004	*2,39%*
11	Spain	794	*1,85%*	11	Belgium	754	*1,85%*	11	Belgium	1.988	*2,38%*
12	USA	761	*1,77%*	12	Spain	727	*1,79%*	12	Hungary	1.612	*1,93%*
13	China	731	*1,70%*	13	Russia	556	*1,37%*	13	Spain	1.520	*1,82%*
14	Hungary	689	*1,60%*	14	Sweden	431	*1,06%*	14	Switzerland	1.040	*1,24%*
15	Switzerland	654	*1,52%*	15	Switzerland	386	*0,95%*	15	Sweden	868	*1,04%*
16	Sweden	437	*1,02%*	16	Romania	368	*0,90%*	16	China	832	*0,99%*
17	Ukraine	381	*0,89%*	17	Slovenia	288	*0,71%*	17	Ukraine	578	*0,69%*
18	Japan	370	*0,86%*	18	Croatia	254	*0,62%*	18	Japan	546	*0,65%*
19	Norway	217	*0,51%*	19	Norway	224	*0,55%*	19	Slovenia	488	*0,58%*
20	Finland	213	*0,49%*	20	Denmark	220	*0,54%*	20	Norway	442	*0,53%*
21	Slovenia	201	*0,47%*	21	Ukraine	196	*0,48%*	21	Romania	423	*0,51%*
22	Ireland	198	*0,46%*	22	Finland	194	*0,48%*	22	Denmark	418	*0,50%*
23	Denmark	197	*0,46%*	23	Greece	179	*0,44%*	23	Finland	407	*0,49%*
24	Hong Kong	151	*0,35%*	24	Japan	175	*0,43%*	24	Ireland	317	*0,38%*
25	Algeria	142	*0,33%*	25	Luxembourg	168	*0,41%*	25	Croatia	300	*0,36%*
26	Turkey	138	*0,32%*	26	Portugal	165	*0,41%*	26	Turkey	270	*0,32%*
27	Malaysia	115	*0,27%*	27	Turkey	132	*0,33%*	27	Luxembourg	248	*0,30%*
28	India	104	*0,24%*	28	Bulgaria	131	*0,32%*	28	Greece	242	*0,29%*
29	South Korea	92	*0,21%*	29	Ireland	119	*0,29%*	29	Hong Kong	241	*0,29%*
30	Indonesia	83	*0,19%*	30	Canada	114	*0,28%*	30	Portugal	224	*0,27%*
31	Singapore	83	*0,19%*	31	U.A.Emirates	106	*0,26%*	31	India	203	*0,24%*
32	Luxembourg	80	*0,19%*	32	South Korea	103	*0,25%*	32	South Korea	195	*0,23%*
33	Greece	63	*0,15%*	33	Lithuania	102	*0,25%*	33	Canada	165	*0,20%*
34	Portugal	59	*0,14%*	34	China	101	*0,25%*	34	Bulgaria	160	*0,19%*
35	Romania	55	*0,13%*	35	India	99	*0,24%*	35	Algeria	152	*0,18%*
	EU25	**33.467**	***77,82%***		**EU25**	**33.862**	***83,24%***		**EU25**	**67.329**	***80,45%***
	EU15	**28.483**	***66,23%***		**EU15**	**27.476**	***67,54%***		**EU15**	**55.959**	***66,87%***
	CC	**1.114**	***2,59%***		**CC**	**1.190**	***2,92%***		**CC**	**2.303**	***2,75%***
(a)	NAFTA	812	***1,89%***	(a)	NAFTA	1.357	***3,34%***	(a)	NAFTA	2.169	***2,59%***
(b)	AMLAT	97	***0,23%***	(b)	AMLAT	136	***0,33%***	(b)	AMLAT	233	***0,28%***
(c)	CANDIDATES	5.446	***12,66%***	(c)	CANDIDATES	5.634	***13,85%***	(c)	CANDIDATES	11.080	***13,24%***
(d)	EFTA	872	***2,03%***	(d)	EFTA	619	***1,52%***	(d)	EFTA	1.491	***1,78%***
(e)	MED	199	***0,46%***	(e)	MED	209	***0,51%***	(e)	MED	408	***0,49%***
(f)	ASEAN	444	***1,03%***	(f)	ASEAN	170	***0,42%***	(f)	ASEAN	614	***0,73%***

Source: European Commission's Comext Database.

E. Estonia Main Partners

IMPORTS				EXPORTS				IMPORTS+EXPORTS			
Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World
ESTONIA : TRADE WITH MAIN PARTNERS IN 2002 (Mio euro)											
	WORLD	**6.616**	***100,00%***		**WORLD**	**4.301**	***100,00%***		**WORLD**	**10.917**	***100,00%***
1	Russia	1.558	*23,55%*	1	Finland	974	*22,64%*	1	Finland	2.235	*20,47%*
2	Finland	1.261	*19,06%*	2	Sweden	593	*13,79%*	2	Russia	1.723	*15,78%*
3	Fr Germany	613	*9,26%*	3	Fr Germany	370	*8,60%*	3	Sweden	1.134	*10,38%*
4	Sweden	541	*8,17%*	4	Utd. Kingdom	354	*8,23%*	4	Fr Germany	982	*9,00%*
5	China	325	*4,91%*	5	Latvia	264	*6,13%*	5	Utd. Kingdom	486	*4,46%*
6	Italy	217	*3,28%*	6	Denmark	188	*4,37%*	6	Latvia	408	*3,74%*
7	Lithuania	215	*3,24%*	7	Norway	179	*4,17%*	7	China	340	*3,11%*
8	France	164	*2,48%*	8	USA	167	*3,89%*	8	Denmark	328	*3,01%*
9	Netherlands	147	*2,22%*	9	Russia	165	*3,85%*	9	Netherlands	303	*2,78%*
10	Latvia	145	*2,19%*	10	Netherlands	157	*3,64%*	10	Lithuania	302	*2,76%*
11	Denmark	140	*2,12%*	11	Ukraine	116	*2,69%*	11	Italy	269	*2,46%*
12	Utd. Kingdom	132	*2,00%*	12	Lithuania	87	*2,02%*	12	USA	262	*2,40%*
13	Poland	129	*1,94%*	13	Spain	77	*1,79%*	13	Norway	242	*2,22%*
14	Japan	118	*1,79%*	14	Belgium	69	*1,62%*	14	France	217	*1,99%*
15	Belgium	101	*1,53%*	15	Iceland	69	*1,59%*	15	Ukraine	195	*1,78%*
16	USA	95	*1,43%*	16	France	54	*1,24%*	16	Belgium	171	*1,56%*
17	Ukraine	79	*1,19%*	17	Italy	52	*1,20%*	17	Poland	170	*1,56%*
18	Ivory Coast	71	*1,07%*	18	Hungary	45	*1,06%*	18	Japan	137	*1,25%*
19	Belarus	70	*1,06%*	19	Poland	41	*0,96%*	19	Spain	126	*1,15%*
20	Austria	69	*1,05%*	20	Canada	32	*0,75%*	20	Belarus	93	*0,86%*
21	Norway	63	*0,95%*	21	Switzerland	25	*0,59%*	21	Austria	90	*0,82%*
22	Spain	49	*0,74%*	22	South Korea	25	*0,59%*	22	Switzerland	73	*0,67%*
23	Switzerland	48	*0,73%*	23	Portugal	24	*0,57%*	23	Hungary	72	*0,66%*
24	South Korea	46	*0,69%*	24	Ireland	23	*0,53%*	24	Ivory Coast	72	*0,66%*
25	Czech Republic	39	*0,59%*	25	Belarus	23	*0,53%*	25	South Korea	71	*0,65%*
26	Ireland	32	*0,48%*	26	Austria	21	*0,48%*	26	Iceland	70	*0,64%*
27	Uzbekistan	28	*0,42%*	27	Japan	18	*0,42%*	27	Czech Republic	57	*0,53%*
28	Hungary	27	*0,41%*	28	Czech Republic	18	*0,42%*	28	Ireland	55	*0,50%*
29	Hong Kong	26	*0,39%*	29	Malta	15	*0,35%*	29	Canada	38	*0,35%*
30	Turkey	24	*0,36%*	30	China	15	*0,35%*	30	Malaysia	32	*0,30%*
31	Kasakhstan	22	*0,33%*	31	Malaysia	12	*0,27%*	31	Hong Kong	32	*0,29%*
32	Greece	8	*0,11%*	32	Egypt	11	*0,26%*	32	Portugal	31	*0,28%*
33	Portugal	6	*0,10%*	33	Panama	10	*0,24%*	33	Greece	12	*0,11%*
34	Slovakia	6	*0,09%*	34	Greece	4	*0,10%*	34	Slovakia	9	*0,08%*
35	Slovenia	5	*0,08%*	35	Slovakia	3	*0,07%*	35	Slovenia	6	*0,06%*
	EU25	**4.045**	***61,14%***		**EU25**	**3.418**	***79,46%***		**EU25**	**7.463**	***68,36%***
	EU15	**3.479**	***52,59%***		**EU15**	**2.959**	***68,80%***		**EU15**	**6.439**	***58,98%***
	CC	**95**	***1,43%***		**CC**	**129**	***2,99%***		**CC**	**223**	***2,05%***
(a)	NAFTA	104	***1,57%***	(a)	NAFTA	207	***4,80%***	(a)	NAFTA	310	***2,84%***
(b)	AMLAT	30	***0,46%***	(b)	AMLAT	36	***0,84%***	(b)	AMLAT	67	***0,61%***
(c)	ACCEDING COUN	522	***7,89%***	(c)	ACCEDING COU	627	***14,57%***	(c)	ACCEDING COUI	1.149	***10,52%***
(d)	EFTA	112	***1,69%***	(d)	EFTA	273	***6,35%***	(d)	EFTA	385	***3,53%***
(e)	MED	6	***0,10%***	(e)	MED	22	***0,50%***	(e)	MED	28	***0,26%***
(f)	ASEAN	70	***1,06%***	(f)	ASEAN	19	***0,44%***	(f)	ASEAN	89	***0,82%***

Source: European Commission's Comext Database.

F. Hungary Main Partners

IMPORTS				EXPORTS				IMPORTS+EXPORTS			
Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World
HUNGARY : TRADE WITH MAIN PARTNERS IN 2002 (Mio euro)											
	WORLD	**39.927**	***100,00%***		**WORLD**	**36.503**	***100,00%***		**WORLD**	**76.430**	***100,00%***
1	Fr Germany	11.121	*27,85%*	1	Fr Germany	11.684	*32,01%*	1	Fr Germany	22.805	*29,84%*
2	Austria	3.547	*8,88%*	2	Austria	4.204	*11,52%*	2	Austria	7.751	*10,14%*
3	Italy	2.713	*6,79%*	3	Italy	1.916	*5,25%*	3	Italy	4.628	*6,06%*
4	Russia	2.393	*5,99%*	4	USA	1.736	*4,76%*	4	France	3.606	*4,72%*
5	China	1.994	*5,00%*	5	France	1.638	*4,49%*	5	USA	3.034	*3,97%*
6	France	1.968	*4,93%*	6	Belgium	1.412	*3,87%*	6	Russia	2.900	*3,79%*
7	Japan	1.489	*3,73%*	7	Utd. Kingdom	1.378	*3,78%*	7	Netherlands	2.554	*3,34%*
8	USA	1.298	*3,25%*	8	Netherlands	1.312	*3,59%*	8	Utd. Kingdom	2.535	*3,32%*
9	Netherlands	1.242	*3,11%*	9	Poland	989	*2,71%*	9	Belgium	2.466	*3,23%*
10	Utd. Kingdom	1.157	*2,90%*	10	Czech Republic	846	*2,32%*	10	China	2.185	*2,86%*
11	Belgium	1.054	*2,64%*	11	Romania	675	*1,85%*	11	Poland	1.971	*2,58%*
12	Czech Republic	1.011	*2,53%*	12	Spain	651	*1,78%*	12	Czech Republic	1.857	*2,43%*
13	Poland	982	*2,46%*	13	Russia	507	*1,39%*	13	Japan	1.704	*2,23%*
14	Slovakia	832	*2,08%*	14	Slovakia	483	*1,32%*	14	Slovakia	1.315	*1,72%*
15	Malaysia	699	*1,75%*	15	Switzerland	384	*1,05%*	15	Spain	1.281	*1,68%*
16	Spain	630	*1,58%*	16	Slovenia	341	*0,93%*	16	Romania	1.131	*1,48%*
17	South Korea	551	*1,38%*	17	Sweden	325	*0,89%*	17	Switzerland	864	*1,13%*
18	Singapore	490	*1,23%*	18	Croatia	319	*0,88%*	18	Malaysia	778	*1,02%*
19	Switzerland	480	*1,20%*	19	Turkey	264	*0,72%*	19	Sweden	759	*0,99%*
20	Philippines	460	*1,15%*	20	Ukraine	261	*0,71%*	20	Ukraine	691	*0,90%*
21	Romania	456	*1,14%*	21	Bosnia-Herz.	249	*0,68%*	21	South Korea	611	*0,80%*
22	Sweden	434	*1,09%*	22	Japan	215	*0,59%*	22	Singapore	609	*0,80%*
23	Ukraine	431	*1,08%*	23	China	191	*0,52%*	23	Slovenia	537	*0,70%*
24	Finland	346	*0,87%*	24	Denmark	187	*0,51%*	24	Philippines	503	*0,66%*
25	Brazil	246	*0,62%*	25	Finland	156	*0,43%*	25	Finland	502	*0,66%*
26	Turkey	233	*0,58%*	26	Ireland	144	*0,39%*	26	Turkey	497	*0,65%*
27	Thailand	221	*0,55%*	27	Greece	133	*0,37%*	27	Croatia	405	*0,53%*
28	Denmark	209	*0,52%*	28	Mexico	126	*0,35%*	28	Denmark	396	*0,52%*
29	Hong Kong	201	*0,50%*	29	Singapore	119	*0,33%*	29	Brazil	293	*0,38%*
30	Slovenia	196	*0,49%*	30	Australia	118	*0,32%*	30	Ireland	287	*0,38%*
31	Ireland	143	*0,36%*	31	Bulgaria	107	*0,29%*	31	Hong Kong	260	*0,34%*
32	Portugal	89	*0,22%*	32	Serb.Monten.	98	*0,27%*	32	Greece	205	*0,27%*
33	Greece	71	*0,18%*	33	Portugal	72	*0,20%*	33	Portugal	162	*0,21%*
34	Estonia	45	*0,11%*	34	Lithuania	60	*0,16%*	34	Bulgaria	148	*0,19%*
35	Bulgaria	41	*0,10%*	35	Estonia	42	*0,11%*	35	Lithuania	89	*0,12%*
	EU25	**28.287**	***70,85%***		**EU25**	**28.755**	***78,78%***		**EU25**	**57.042**	***74,63%***
	EU15	**24.724**	***61,92%***		**EU15**	**25.212**	***69,07%***		**EU15**	**49.936**	***65,34%***
	CC	**934**	***2,34%***		**CC**	**1.001**	***2,74%***		**CC**	**1.935**	***2,53%***
(a)	NAFTA	1.535	***3,85%***	(a)	NAFTA	1.909	***5,23%***	(a)	NAFTA	3.444	***4,51%***
(b)	AMLAT	465	***1,16%***	(b)	AMLAT	195	***0,53%***	(b)	AMLAT	660	***0,86%***
(c)	CANDIDATES	2.820	***7,06%***	(c)	CANDIDATES	2.323	***6,36%***	(c)	CANDIDATES	5.143	***6,73%***
(d)	EFTA	540	***1,35%***	(d)	EFTA	447	***1,23%***	(d)	EFTA	988	***1,29%***
(e)	MED	120	***0,30%***	(e)	MED	194	***0,53%***	(e)	MED	314	***0,41%***
(f)	ASEAN	2.055	***5,15%***	(f)	ASEAN	291	***0,80%***	(f)	ASEAN	2.346	***3,07%***

Source: European Commission's Comext Database.

G. Latvia Main Partners

IMPORTS				EXPORTS				IMPORTS+EXPORTS			
Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World
LATVIA: TRADE WITH MAIN PARTNERS IN 2002 (Mio euro)											
	WORLD	**4.636**	***100,00%***		**WORLD**	**2.773**	***100,00%***		**WORLD**	**7.409**	***100,00%***
1	Fr Germany	867	*18,71%*	1	Utd. Kingdom	576	*20,76%*	1	Fr Germany	1.274	*17,19%*
2	Lithuania	534	*11,51%*	2	Fr Germany	406	*14,65%*	2	Utd. Kingdom	698	*9,42%*
3	Russia	374	*8,07%*	3	Sweden	347	*12,51%*	3	Lithuania	663	*8,94%*
4	Finland	323	*6,97%*	4	Denmark	163	*5,88%*	4	Sweden	605	*8,17%*
5	Poland	299	*6,46%*	5	Russia	141	*5,09%*	5	Russia	515	*6,96%*
6	Estonia	269	*5,81%*	6	Lithuania	129	*4,64%*	6	Finland	396	*5,35%*
7	Sweden	259	*5,58%*	7	Estonia	120	*4,34%*	7	Estonia	390	*5,26%*
8	Italy	230	*4,97%*	8	USA	104	*3,76%*	8	Poland	340	*4,58%*
9	Netherlands	177	*3,82%*	9	Netherlands	101	*3,63%*	9	Denmark	303	*4,08%*
10	France	141	*3,03%*	10	France	76	*2,76%*	10	Italy	293	*3,95%*
11	Denmark	139	*3,01%*	11	Finland	73	*2,64%*	11	Netherlands	278	*3,75%*
12	Utd. Kingdom	122	*2,63%*	12	Italy	62	*2,25%*	12	France	217	*2,93%*
13	Belarus	117	*2,52%*	13	Algeria	51	*1,82%*	13	USA	171	*2,31%*
14	Belgium	101	*2,18%*	14	Belgium	44	*1,60%*	14	Belarus	153	*2,06%*
15	Austria	86	*1,86%*	15	Ukraine	44	*1,59%*	15	Belgium	145	*1,96%*
16	Switzerland	82	*1,77%*	16	Poland	40	*1,45%*	16	Austria	102	*1,38%*
17	USA	67	*1,45%*	17	Norway	40	*1,43%*	17	Ukraine	102	*1,38%*
18	Czech Republic	63	*1,37%*	18	Belarus	36	*1,31%*	18	Norway	93	*1,26%*
19	Ukraine	58	*1,25%*	19	Ireland	26	*0,94%*	19	Switzerland	91	*1,23%*
20	Spain	57	*1,22%*	20	Egypt	23	*0,82%*	20	Czech Republic	78	*1,05%*
21	Norway	54	*1,16%*	21	Portugal	22	*0,80%*	21	Spain	77	*1,04%*
22	China	45	*0,97%*	22	Spain	20	*0,74%*	22	Algeria	51	*0,68%*
23	Hungary	33	*0,71%*	23	Japan	19	*0,69%*	23	China	48	*0,65%*
24	Slovakia	26	*0,57%*	24	Austria	16	*0,58%*	24	Ireland	42	*0,57%*
25	Turkey	25	*0,55%*	25	Czech Republic	14	*0,51%*	25	Hungary	38	*0,51%*
26	Ireland	16	*0,35%*	26	Canada	11	*0,38%*	26	Slovakia	34	*0,46%*
27	Slovenia	13	*0,27%*	27	Kasakhstan	10	*0,36%*	27	Portugal	31	*0,42%*
28	Israel	10	*0,22%*	28	Iceland	10	*0,35%*	28	Turkey	30	*0,41%*
29	Portugal	9	*0,19%*	29	Switzerland	9	*0,34%*	29	Japan	26	*0,35%*
30	South Korea	9	*0,19%*	30	Greece	9	*0,32%*	30	Egypt	24	*0,32%*
31	India	8	*0,17%*	31	Slovakia	8	*0,29%*	31	Canada	17	*0,23%*
32	Bulgaria	7	*0,16%*	32	Hong Kong	6	*0,23%*	32	Slovenia	16	*0,22%*
33	Greece	7	*0,15%*	33	Peru	6	*0,22%*	33	Greece	16	*0,21%*
34	Luxembourg	5	*0,11%*	34	Hungary	5	*0,18%*	34	Iceland	13	*0,18%*
35	Romania	3	*0,06%*	35	Slovenia	3	*0,12%*	35	Bulgaria	8	*0,11%*
	EU25	**3.787**	***81,68%***		**EU25**	**2.263**	***81,60%***		**EU25**	**6.049**	***81,65%***
	EU15	**2.539**	***54,77%***		**EU15**	**1.943**	***70,06%***		**EU15**	**4.482**	***60,49%***
	CC	**88**	***1,90%***		**CC**	**77**	***2,79%***		**CC**	**166**	***2,24%***
(a)	NAFTA	75	***1,61%***	(a)	NAFTA	115	***4,15%***	(a)	NAFTA	190	***2,56%***
(b)	AMLAT	10	***0,21%***	(b)	AMLAT	12	***0,44%***	(b)	AMLAT	22	***0,30%***
(c)	CANDIDATES	1.037	***22,36%***	(c)	CANDIDATES	417	***15,05%***	(c)	CANDIDATES	1.454	***19,63%***
(d)	EFTA	139	***3,00%***	(d)	EFTA	59	***2,13%***	(d)	EFTA	198	***2,67%***
(e)	MED.	38	***0,82%***	(e)	MED.	82	***2,96%***	(e)	MED.	120	***1,62%***
(f)	ASEAN	9	***0,18%***	(f)	ASEAN	4	***0,14%***	(f)	ASEAN	12	***0,17%***

Source: European Commission's Comext Database.

H. Lithuania Main Partners

IMPORTS				EXPORTS				IMPORTS+EXPORTS			
Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World
LITHUANIA : TRADE WITH MAIN PARTNERS IN 2002 (Mio euro)											
	WORLD	**8.270**	***100,00%***		**WORLD**	**5.537**	***100,00%***		**WORLD**	**13.807**	***100,00%***
1	Russia	1.870	*22,61%*	1	Fr Germany	674	*12,18%*	1	Russia	2.218	*16,07%*
2	Fr Germany	1.506	*18,21%*	2	Latvia	421	*7,60%*	2	Fr Germany	2.180	*15,79%*
3	Poland	987	*11,93%*	3	Utd. Kingdom	395	*7,14%*	3	Poland	1.191	*8,62%*
4	Italy	431	*5,21%*	4	Russia	349	*6,30%*	4	Utd. Kingdom	630	*4,56%*
5	France	285	*3,44%*	5	France	332	*6,00%*	5	Latvia	623	*4,51%*
6	Sweden	279	*3,38%*	6	USA	307	*5,55%*	6	France	617	*4,47%*
7	Finland	269	*3,25%*	7	Sweden	276	*4,99%*	7	Sweden	556	*4,03%*
8	Denmark	261	*3,16%*	8	Denmark	262	*4,74%*	8	Italy	547	*3,96%*
9	Utd. Kingdom	234	*2,84%*	9	Netherlands	221	*3,99%*	9	Denmark	524	*3,79%*
10	Netherlands	227	*2,74%*	10	Belarus	205	*3,70%*	10	Netherlands	448	*3,24%*
11	Latvia	202	*2,44%*	11	Poland	204	*3,68%*	11	USA	427	*3,09%*
12	Belgium	181	*2,19%*	12	Ukraine	178	*3,21%*	12	Belarus	344	*2,49%*
13	Spain	161	*1,94%*	13	Estonia	169	*3,05%*	13	Finland	327	*2,37%*
14	Czech Republic	159	*1,92%*	14	Spain	166	*3,00%*	14	Spain	327	*2,37%*
15	Belarus	139	*1,68%*	15	Italy	117	*2,10%*	15	Ukraine	296	*2,15%*
16	China	132	*1,59%*	16	Belgium	112	*2,01%*	16	Estonia	296	*2,14%*
17	Estonia	127	*1,54%*	17	Norway	109	*1,96%*	17	Belgium	293	*2,12%*
18	USA	120	*1,45%*	18	Turkey	75	*1,35%*	18	Czech Republic	189	*1,37%*
19	Ukraine	119	*1,44%*	19	Finland	58	*1,05%*	19	Norway	182	*1,32%*
20	Norway	74	*0,89%*	20	Portugal	52	*0,93%*	20	China	136	*0,98%*
21	Austria	73	*0,88%*	21	Switzerland	30	*0,54%*	21	Turkey	122	*0,88%*
22	Hungary	62	*0,74%*	22	Czech Republic	30	*0,53%*	22	Austria	93	*0,67%*
23	Switzerland	56	*0,68%*	23	Ireland	27	*0,49%*	23	Hungary	87	*0,63%*
24	South Korea	51	*0,61%*	24	Hungary	25	*0,46%*	24	Switzerland	86	*0,62%*
25	Turkey	47	*0,57%*	25	Kasakhstan	25	*0,44%*	25	Portugal	64	*0,46%*
26	Slovakia	42	*0,51%*	26	Uzbekistan	23	*0,41%*	26	South Korea	55	*0,40%*
27	Slovenia	36	*0,44%*	27	Canada	22	*0,40%*	27	Slovakia	51	*0,37%*
28	Japan	29	*0,35%*	28	Austria	20	*0,36%*	28	Japan	47	*0,34%*
29	India	22	*0,27%*	29	Japan	18	*0,32%*	29	Ireland	44	*0,32%*
30	Brazil	21	*0,26%*	30	Moldova	12	*0,22%*	30	Uzbekistan	40	*0,29%*
31	Malaysia	20	*0,24%*	31	Pakistan	10	*0,18%*	31	Slovenia	38	*0,27%*
32	Ireland	17	*0,21%*	32	Slovakia	9	*0,16%*	32	Kasakhstan	35	*0,25%*
33	Luxembourg	13	*0,15%*	33	Iceland	7	*0,12%*	33	Canada	31	*0,22%*
34	Portugal	13	*0,15%*	34	Bulgaria	6	*0,10%*	34	Bulgaria	15	*0,11%*
35	Bulgaria	9	*0,11%*	35	Romania	4	*0,07%*	35	Luxembourg	14	*0,10%*
	EU25	**5.572**	***67,38%***		**EU25**	**3.579**	***64,65%***		**EU25**	**9.152**	***66,28%***
	EU15	**3.949**	***47,75%***		**EU15**	**2.712**	***48,98%***		**EU15**	**6.661**	***48,24%***
	CC	**190**	***2,30%***		**CC**	**244**	***4,41%***		**CC**	**435**	***3,15%***
(a)	NAFTA	132	***1,59%***	(a)	NAFTA	331	***5,99%***	(a)	NAFTA	463	***3,36%***
(b)	AMLAT	75	***0,91%***	(b)	AMLAT	9	***0,16%***	(b)	AMLAT	84	***0,61%***
(c)	CANDIDATES	757	***9,16%***	(c)	CANDIDATES	1.219	***22,01%***	(c)	CANDIDATES	1.976	***14,31%***
(d)	EFTA	148	***1,79%***	(d)	EFTA	145	***2,62%***	(d)	EFTA	293	***2,12%***
(e)	MED	17	***0,20%***	(e)	MED	12	***0,22%***	(e)	MED	29	***0,21%***
(f)	ASEAN	54	***0,65%***	(f)	ASEAN	12	***0,21%***	(f)	ASEAN	65	***0,47%***

Source: European Commission's Comext Database.

I. Poland Main Partners

IMPORTS				EXPORTS				IMPORTS+EXPORTS			
Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World
POLAND: TRADE WITH MAIN PARTNERS IN 2002 (Mio euro)											
	WORLD	**58.480**	***100,00%***		**WORLD**	**43.499**	***100,00%***		**WORLD**	**101.980**	***100,00%***
1	Fr Germany	15.922	*27,23%*	1	Fr Germany	13.986	*32,15%*	1	Fr Germany	29.908	*29,33%*
2	Russia	4.660	*7,97%*	2	Italy	2.395	*5,51%*	2	Italy	6.649	*6,52%*
3	Italy	4.254	*7,27%*	3	France	2.113	*4,86%*	3	Russia	6.068	*5,95%*
4	France	3.808	*6,51%*	4	Utd. Kingdom	1.936	*4,45%*	4	France	5.921	*5,81%*
5	Netherlands	2.688	*4,60%*	5	Czech Republic	1.728	*3,97%*	5	Netherlands	4.296	*4,21%*
6	China	2.197	*3,76%*	6	Netherlands	1.608	*3,70%*	6	Utd. Kingdom	3.988	*3,91%*
7	Utd. Kingdom	2.052	*3,51%*	7	Russia	1.408	*3,24%*	7	Czech Republic	3.652	*3,58%*
8	Belgium	1.948	*3,33%*	8	Sweden	1.326	*3,05%*	8	Belgium	3.196	*3,13%*
9	Czech Republic	1.924	*3,29%*	9	Ukraine	1.248	*2,87%*	9	USA	3.085	*3,03%*
10	USA	1.922	*3,29%*	10	Belgium	1.248	*2,87%*	10	Sweden	2.680	*2,63%*
11	Sweden	1.354	*2,31%*	11	USA	1.164	*2,68%*	11	China	2.415	*2,37%*
12	Austria	1.281	*2,19%*	12	Hungary	1.006	*2,31%*	12	Austria	2.170	*2,13%*
13	Spain	1.278	*2,19%*	13	Denmark	983	*2,26%*	13	Spain	1.997	*1,96%*
14	Japan	1.099	*1,88%*	14	Austria	889	*2,04%*	14	Denmark	1.806	*1,77%*
15	Denmark	822	*1,41%*	15	Norway	771	*1,77%*	15	Hungary	1.779	*1,74%*
16	Slovakia	813	*1,39%*	16	Spain	719	*1,65%*	16	Ukraine	1.768	*1,73%*
17	Finland	798	*1,36%*	17	Slovakia	567	*1,30%*	17	Norway	1.482	*1,45%*
18	Switzerland	773	*1,32%*	18	Lithuania	380	*0,87%*	18	Slovakia	1.381	*1,35%*
19	Hungary	772	*1,32%*	19	Portugal	372	*0,85%*	19	Japan	1.174	*1,15%*
20	Norway	711	*1,22%*	20	Romania	368	*0,85%*	20	Switzerland	1.123	*1,10%*
21	Turkey	665	*1,14%*	21	Switzerland	350	*0,81%*	21	Finland	1.092	*1,07%*
22	South Korea	611	*1,05%*	22	Finland	294	*0,68%*	22	Turkey	935	*0,92%*
23	Ukraine	520	*0,89%*	23	Belarus	276	*0,63%*	23	South Korea	651	*0,64%*
24	Slovenia	305	*0,52%*	24	Turkey	270	*0,62%*	24	Lithuania	582	*0,57%*
25	Malaysia	286	*0,49%*	25	China	219	*0,50%*	25	Belarus	516	*0,51%*
26	Ireland	284	*0,49%*	26	Latvia	216	*0,50%*	26	Portugal	512	*0,50%*
27	Brazil	250	*0,43%*	27	Canada	190	*0,44%*	27	Romania	480	*0,47%*
28	Belarus	240	*0,41%*	28	Slovenia	168	*0,39%*	28	Slovenia	473	*0,46%*
29	Indonesia	237	*0,41%*	29	Greece	143	*0,33%*	29	Ireland	398	*0,39%*
30	Singapore	237	*0,40%*	30	Estonia	141	*0,32%*	30	Canada	359	*0,35%*
31	Thailand	215	*0,37%*	31	Croatia	129	*0,30%*	31	Brazil	356	*0,35%*
32	Lithuania	201	*0,34%*	32	Ireland	113	*0,26%*	32	Greece	266	*0,26%*
33	Portugal	140	*0,24%*	33	Brazil	106	*0,24%*	33	Latvia	253	*0,25%*
34	Greece	122	*0,21%*	34	Bulgaria	106	*0,24%*	34	Estonia	176	*0,17%*
35	Romania	112	*0,19%*	35	Luxembourg	35	*0,08%*	35	Bulgaria	149	*0,15%*
	EU25	**40.881**	***69,90%***		**EU25**	**32.840**	***75,50%***		**EU25**	**73.721**	***72,29%***
	EU15	**36.753**	***62,85%***		**EU15**	**28.160**	***64,74%***		**EU15**	**64.913**	***63,65%***
	CC	**1.825**	***3,12%***		**CC**	**1.348**	***3,10%***		**CC**	**3.172**	***3,11%***
(a)	NAFTA	2.193	***3,75%***	(a)	NAFTA	1.410	***3,24%***	(a)	NAFTA	3.603	***3,53%***
(b)	AMLAT	816	***1,40%***	(b)	AMLAT	315	***0,73%***	(b)	AMLAT	1.131	***1,11%***
(c)	ACCEDING COUN	4.452	***7,61%***	(c)	ACCEDING COU	4.996	***11,49%***	(c)	ACCEDING COUI	9.449	***9,27%***
(d)	EFTA	1.542	***2,64%***	(d)	EFTA	1.163	***2,67%***	(d)	EFTA	2.704	***2,65%***
(e)	MED	1.204	***2,06%***	(e)	MED	166	***0,38%***	(e)	MED	1.370	***1,34%***
(f)	ASEAN	256	***0,44%***	(f)	ASEAN	313	***0,72%***	(f)	ASEAN	569	***0,56%***

Source: European Commission's Comext Database.

J. Romania Main Partners

IMPORTS				EXPORTS				IMPORTS+EXPORTS			
Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World
ROMANIA : TRADE WITH MAIN PARTNERS IN 2002 (Mio euro)											
	WORLD	**18.881**	***100,00%***		**WORLD**	**14.675**	***100,00%***		**WORLD**	**33.556**	***100,00%***
1	Italy	3.604	*19,09%*	1	Italy	3.803	*25,92%*	1	Italy	7.407	*22,08%*
2	Fr Germany	3.251	*17,22%*	2	Fr Germany	2.337	*15,92%*	2	Fr Germany	5.588	*16,65%*
3	France	1.175	*6,22%*	3	France	1.203	*8,20%*	3	France	2.378	*7,09%*
4	Russia	1.094	*5,79%*	4	Utd. Kingdom	985	*6,71%*	4	Utd. Kingdom	1.659	*4,95%*
5	Austria	864	*4,58%*	5	USA	716	*4,88%*	5	Austria	1.474	*4,39%*
6	Hungary	830	*4,40%*	6	Austria	610	*4,16%*	6	Hungary	1.287	*3,84%*
7	Utd. Kingdom	674	*3,57%*	7	Turkey	517	*3,52%*	7	Russia	1.162	*3,46%*
8	Netherlands	543	*2,88%*	8	Hungary	457	*3,11%*	8	USA	1.005	*2,99%*
9	Turkey	432	*2,29%*	9	Netherlands	353	*2,41%*	9	Turkey	949	*2,83%*
10	Belgium	381	*2,02%*	10	Greece	342	*2,33%*	10	Netherlands	896	*2,67%*
11	Ukraine	367	*1,95%*	11	Belgium	294	*2,00%*	11	Belgium	675	*2,01%*
12	China	332	*1,76%*	12	Spain	289	*1,97%*	12	Greece	639	*1,90%*
13	Czech Republic	302	*1,60%*	13	Serb.Monten.	177	*1,21%*	13	Spain	526	*1,57%*
14	Greece	298	*1,58%*	14	Bulgaria	172	*1,17%*	14	Poland	445	*1,33%*
15	Poland	295	*1,56%*	15	Poland	151	*1,03%*	15	China	423	*1,26%*
16	USA	289	*1,53%*	16	Israel	139	*0,95%*	16	Ukraine	419	*1,25%*
17	Brazil	248	*1,31%*	17	Egypt	129	*0,88%*	17	Czech Republic	384	*1,14%*
18	Spain	237	*1,26%*	18	Moldova	128	*0,87%*	18	Bulgaria	341	*1,02%*
19	South Korea	192	*1,02%*	19	Norway	111	*0,75%*	19	Israel	312	*0,93%*
20	Switzerland	178	*0,94%*	20	Slovenia	98	*0,67%*	20	Brazil	266	*0,79%*
21	Kasakhstan	174	*0,92%*	21	China	91	*0,62%*	21	Switzerland	238	*0,71%*
22	Israel	173	*0,92%*	22	Czech Republic	82	*0,56%*	22	South Korea	238	*0,71%*
23	Bulgaria	169	*0,89%*	23	Sweden	81	*0,55%*	23	Serb.Monten.	217	*0,65%*
24	Slovakia	156	*0,83%*	24	Syria	79	*0,54%*	24	Sweden	211	*0,63%*
25	Sweden	130	*0,69%*	25	Canada	77	*0,53%*	25	Slovakia	203	*0,60%*
26	Slovenia	79	*0,42%*	26	Russia	68	*0,46%*	26	Kasakhstan	191	*0,57%*
27	Turkmenistan	60	*0,32%*	27	Nigeria	60	*0,41%*	27	Slovenia	177	*0,53%*
28	Denmark	60	*0,32%*	28	Switzerland	60	*0,41%*	28	Egypt	174	*0,52%*
29	Iraq	59	*0,31%*	29	Saudi Arabia	54	*0,37%*	29	Moldova	172	*0,51%*
30	Ireland	57	*0,30%*	30	Ukraine	52	*0,35%*	30	Denmark	90	*0,27%*
31	South Africa	49	*0,26%*	31	Slovakia	47	*0,32%*	31	Ireland	73	*0,22%*
32	Finland	40	*0,21%*	32	Portugal	36	*0,24%*	32	Portugal	68	*0,20%*
33	Portugal	32	*0,17%*	33	Denmark	31	*0,21%*	33	Finland	49	*0,15%*
34	Luxembourg	6	*0,03%*	34	Ireland	16	*0,11%*	34	Luxembourg	8	*0,02%*
35	Lithuania	2	*0,01%*	35	Finland	9	*0,06%*	35	Lithuania	8	*0,02%*
	EU25	**13.185**	***69,84%***		**EU25**	**11.393**	***77,64%***		**EU25**	**24.579**	***73,25%***
	EU15	**11.352**	***60,13%***		**EU15**	**10.387**	***70,78%***		**EU15**	**21.739**	***64,78%***
	CC	**624**	***3,30%***		**CC**	**682**	***4,65%***		**CC**	**1.305**	***3,89%***
(a)	NAFTA	319	***1,69%***	(a)	NAFTA	810	***5,52%***	(a)	NAFTA	1.129	***3,36%***
(b)	AMLAT	378	***2,00%***	(b)	AMLAT	120	***0,81%***	(b)	AMLAT	498	***1,48%***
(c)	CANDIDATES	1.717	***9,09%***	(c)	CANDIDATES	731	***4,98%***	(c)	CANDIDATES	2.448	***7,29%***
(d)	EFTA	214	***1,13%***	(d)	EFTA	174	***1,18%***	(d)	EFTA	388	***1,16%***
(e)	MED	276	***1,46%***	(e)	MED	486	***3,31%***	(e)	MED	762	***2,27%***
(f)	ASEAN	142	***0,75%***	(f)	ASEAN	82	***0,56%***	(f)	ASEAN	225	***0,67%***

Source: European Commission's Comext Database.

K. Slovakia Main Partners

IMPORTS				EXPORTS				IMPORTS+EXPORTS			
Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World
SLOVAKIA : TRADE WITH MAIN PARTNERS IN 2002 (Mio euro)											
	WORLD	**17.513**	***100,00%***		**WORLD**	**15.216**	***100,00%***		**WORLD**	**32.729**	***100,00%***
1	Fr Germany	4.054	*23,15%*	1	Fr Germany	4.987	*32,78%*	1	Fr Germany	9.041	*27,62%*
2	Czech Republic	3.139	*17,92%*	2	Czech Republic	2.253	*14,81%*	2	Czech Republic	5.392	*16,47%*
3	Russia	2.359	*13,47%*	3	Austria	1.700	*11,17%*	3	Austria	2.791	*8,53%*
4	Austria	1.090	*6,23%*	4	Italy	1.176	*7,73%*	4	Russia	2.501	*7,64%*
5	Italy	1.007	*5,75%*	5	Poland	858	*5,64%*	5	Italy	2.183	*6,67%*
6	France	629	*3,59%*	6	Hungary	721	*4,74%*	6	Poland	1.464	*4,47%*
7	Poland	606	*3,46%*	7	France	400	*2,63%*	7	Hungary	1.247	*3,81%*
8	Hungary	526	*3,00%*	8	Utd. Kingdom	364	*2,39%*	8	France	1.029	*3,15%*
9	Spain	492	*2,81%*	9	Netherlands	291	*1,91%*	9	Spain	697	*2,13%*
10	Netherlands	375	*2,14%*	10	USA	260	*1,71%*	10	Utd. Kingdom	681	*2,08%*
11	Belgium	346	*1,97%*	11	Belgium	234	*1,54%*	11	Netherlands	666	*2,03%*
12	Utd. Kingdom	317	*1,81%*	12	Switzerland	217	*1,43%*	12	Belgium	579	*1,77%*
13	Ukraine	245	*1,40%*	13	Spain	205	*1,35%*	13	Switzerland	438	*1,34%*
14	China	228	*1,30%*	14	Romania	171	*1,13%*	14	Ukraine	412	*1,26%*
15	Switzerland	221	*1,26%*	15	Ukraine	167	*1,10%*	15	USA	368	*1,13%*
16	Sweden	136	*0,78%*	16	Slovenia	162	*1,07%*	16	Slovenia	294	*0,90%*
17	Slovenia	132	*0,75%*	17	Russia	142	*0,93%*	17	China	253	*0,77%*
18	USA	108	*0,62%*	18	Japan	133	*0,87%*	18	Sweden	240	*0,73%*
19	Finland	86	*0,49%*	19	Sweden	104	*0,68%*	19	Japan	210	*0,64%*
20	Turkey	83	*0,47%*	20	Croatia	92	*0,61%*	20	Romania	208	*0,63%*
21	Japan	77	*0,44%*	21	Denmark	86	*0,56%*	21	Croatia	157	*0,48%*
22	Croatia	65	*0,37%*	22	Finland	56	*0,37%*	22	Denmark	143	*0,44%*
23	Denmark	58	*0,33%*	23	Turkey	53	*0,35%*	23	Finland	142	*0,43%*
24	South Korea	51	*0,29%*	24	Greece	53	*0,35%*	24	Turkey	137	*0,42%*
25	Malaysia	44	*0,25%*	25	India	49	*0,32%*	25	India	84	*0,26%*
26	Ireland	40	*0,23%*	26	Bulgaria	48	*0,31%*	26	Greece	73	*0,22%*
27	Indonesia	39	*0,22%*	27	Serb.Monten.	41	*0,27%*	27	Bulgaria	66	*0,20%*
28	Romania	36	*0,21%*	28	Egypt	35	*0,23%*	28	Serb.Monten.	59	*0,18%*
29	India	35	*0,20%*	29	Norway	32	*0,21%*	29	South Korea	57	*0,17%*
30	Belarus	34	*0,19%*	30	Portugal	32	*0,21%*	30	Ireland	55	*0,17%*
31	Brazil	30	*0,17%*	31	Canada	31	*0,20%*	31	Portugal	54	*0,17%*
32	Portugal	22	*0,13%*	32	Latvia	29	*0,19%*	32	Norway	54	*0,17%*
33	Greece	21	*0,12%*	33	Lithuania	26	*0,17%*	33	Bulgaria	54	*0,17%*
34	Bulgaria	19	*0,11%*	34	Ireland	15	*0,10%*	34	Malaysia	47	*0,15%*
35	Latvia	9	*0,05%*	35	Estonia	10	*0,06%*	35	Latvia	39	*0,12%*
	EU25	**13.139**	***75,02%***		**EU25**	**13.982**	***91,89%***		**EU25**	**27.121**	***82,87%***
	EU15	**8.672**	***49,52%***		**EU15**	**9.704**	***63,77%***		**EU15**	**18.376**	***56,14%***
	CC	**575**	***3,28%***		**CC**	**305**	***2,01%***		**CC**	**880**	***2,69%***
(a)	NAFTA	142	***0,81%***	(a)	NAFTA	298	***1,96%***	(a)	NAFTA	440	***1,34%***
(b)	AMLAT	99	***0,56%***	(b)	AMLAT	37	***0,25%***	(b)	AMLAT	136	***0,42%***
(c)	CANDIDATES	4.088	***23,34%***	(c)	CANDIDATES	4.134	***27,17%***	(c)	CANDIDATES	8.222	***25,12%***
(d)	EFTA	243	***1,39%***	(d)	EFTA	252	***1,65%***	(d)	EFTA	495	***1,51%***
(e)	MED	30	***0,17%***	(e)	MED	68	***0,45%***	(e)	MED	99	***0,30%***
(f)	ASEAN	142	***0,81%***	(f)	ASEAN	17	***0,11%***	(f)	ASEAN	158	***0,48%***

Source: European Commission's Comext Database.

L. Slovenia Main Partners

IMPORTS				EXPORTS				IMPORTS+EXPORTS			
Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World
SLOVENIA : TRADE WITH MAIN PARTNERS IN 2002 (Mio euro)											
	WORLD	**11.574**	***100,00%***		**WORLD**	**10.962**	***100,00%***		**WORLD**	**22.536**	***100,00%***
1	Fr Germany	2.358	*20,38%*	1	Fr Germany	2.461	*22,45%*	1	Fr Germany	4.820	*21,39%*
2	Italy	2.191	*18,93%*	2	Italy	1.457	*13,29%*	2	Italy	3.648	*16,19%*
3	Austria	1.369	*11,83%*	3	Austria	1.173	*10,70%*	3	Austria	2.542	*11,28%*
4	France	1.167	*10,08%*	4	Croatia	836	*7,63%*	4	France	1.982	*8,80%*
5	Croatia	426	*3,68%*	5	France	815	*7,44%*	5	Croatia	1.262	*5,60%*
6	Netherlands	372	*3,22%*	6	Bosnia-Herz.	460	*4,19%*	6	Utd. Kingdom	554	*2,46%*
7	Spain	354	*3,06%*	7	Poland	326	*2,98%*	7	Hungary	540	*2,40%*
8	Hungary	321	*2,78%*	8	USA	310	*2,82%*	8	Russia	536	*2,38%*
9	Utd. Kingdom	285	*2,46%*	9	Russia	289	*2,63%*	9	USA	529	*2,35%*
10	Czech Republic	261	*2,25%*	10	Utd. Kingdom	269	*2,46%*	10	Bosnia-Herz.	526	*2,33%*
11	Russia	247	*2,14%*	11	Czech Republic	257	*2,35%*	11	Czech Republic	518	*2,30%*
12	USA	219	*1,89%*	12	Serb.Monten.	243	*2,22%*	12	Netherlands	516	*2,29%*
13	Belgium	219	*1,89%*	13	Hungary	219	*2,00%*	13	Spain	478	*2,12%*
14	China	191	*1,65%*	14	Slovakia	148	*1,35%*	14	Poland	474	*2,11%*
15	Switzerland	169	*1,46%*	15	Netherlands	144	*1,31%*	15	Belgium	309	*1,37%*
16	Slovakia	155	*1,34%*	16	For.JRep.Mac	141	*1,29%*	16	Slovakia	303	*1,35%*
17	Poland	148	*1,28%*	17	Switzerland	135	*1,23%*	17	Switzerland	303	*1,35%*
18	Japan	100	*0,87%*	18	Spain	124	*1,13%*	18	Serb.Monten.	288	*1,28%*
19	Turkey	93	*0,80%*	19	Sweden	94	*0,86%*	19	China	208	*0,92%*
20	Sweden	89	*0,77%*	20	Belgium	91	*0,83%*	20	Sweden	183	*0,81%*
21	Romania	86	*0,74%*	21	Romania	90	*0,82%*	21	Romania	177	*0,78%*
22	Algeria	76	*0,65%*	22	Denmark	78	*0,71%*	22	For.JRep.Mac	170	*0,75%*
23	South Korea	68	*0,59%*	23	Ukraine	61	*0,56%*	23	Turkey	135	*0,60%*
24	Bosnia-Herz.	66	*0,57%*	24	Bulgaria	48	*0,44%*	24	Japan	121	*0,54%*
25	Brazil	46	*0,40%*	25	Turkey	42	*0,38%*	25	Denmark	120	*0,53%*
26	Serb.Monten.	45	*0,39%*	26	Lithuania	35	*0,32%*	26	Algeria	82	*0,37%*
27	Denmark	42	*0,36%*	27	Egypt	35	*0,32%*	27	South Korea	81	*0,36%*
28	Indonesia	42	*0,36%*	28	Finland	33	*0,30%*	28	Ukraine	78	*0,35%*
29	Finland	40	*0,34%*	29	Greece	32	*0,29%*	29	Bulgaria	75	*0,33%*
30	Israel	35	*0,31%*	30	Iran	31	*0,28%*	30	Finland	72	*0,32%*
31	Ireland	35	*0,30%*	31	Canada	30	*0,27%*	31	Brazil	64	*0,28%*
32	Greece	27	*0,23%*	32	Portugal	20	*0,19%*	32	Greece	58	*0,26%*
33	Bulgaria	26	*0,23%*	33	Ireland	11	*0,10%*	33	Ireland	46	*0,21%*
34	Luxembourg	20	*0,17%*	34	Latvia	11	*0,10%*	34	Lithuania	36	*0,16%*
35	Portugal	8	*0,07%*	35	Luxembourg	9	*0,08%*	35	Luxembourg	28	*0,13%*
	EU25	**9.572**	***82,70%***		**EU25**	**7.947**	***72,50%***		**EU25**	**17.519**	***77,74%***
	EU15	**8.574**	***74,08%***		**EU15**	**6.812**	***62,14%***		**EU15**	**15.386**	***68,27%***
	CC	**423**	***3,66%***		**CC**	**188**	***1,71%***		**CC**	**611**	***2,71%***
(a)	NAFTA	259	***2,24%***	(a)	NAFTA	349	***3,19%***	(a)	NAFTA	608	***2,70%***
(b)	AMLAT	91	***0,79%***	(b)	AMLAT	44	***0,40%***	(b)	AMLAT	135	***0,60%***
(c)	CANDIDATES	932	***8,06%***	(c)	CANDIDATES	800	***7,30%***	(c)	CANDIDATES	1.732	***7,69%***
(d)	EFTA	187	***1,62%***	(d)	EFTA	167	***1,52%***	(d)	EFTA	354	***1,57%***
(e)	MED	124	***1,07%***	(e)	MED	81	***0,74%***	(e)	MED	206	***0,91%***
(f)	ASEAN	104	***0,89%***	(f)	ASEAN	17	***0,16%***	(f)	ASEAN	121	***0,54%***

Source: European Commission's Comext Database.

Table III-5 – Detailed External Trade of the EU (2002)

IMPORTS				EXPORTS				IMPORTS+EXPORTS			
Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World
EU : TRADE WITH MAIN PARTNERS IN 2002 (Mio euro)											
	WORLD	**989.453**	***100,00%***		**WORLD**	**995.018**	***100,00%***		**WORLD**	**1.984.470**	***100,00%***
1	USA	175.536	*17,74%*	1	USA	240.595	*24,18%*	1	USA	416.132	*20,97%*
2	China	81.871	*8,27%*	2	Switzerland	70.706	*7,11%*	2	Switzerland	152.577	*7,69%*
3	Japan	68.587	*6,93%*	3	Japan	42.364	*4,26%*	3	China	110.951	*5,59%*
4	Switzerland	58.808	*5,94%*	4	Poland	37.345	*3,75%*	4	Japan	96.153	*4,85%*
5	Russia	47.723	*4,82%*	5	China	34.196	*3,44%*	5	Russia	81.919	*4,13%*
6	Norway	45.917	*4,64%*	6	Russia	30.447	*3,06%*	6	Norway	76.364	*3,85%*
7	Poland	28.260	*2,86%*	7	Czech Rep.	29.129	*2,93%*	7	Poland	57.389	*2,89%*
8	Czech Rep.	27.538	*2,78%*	8	Norway	26.589	*2,67%*	8	Czech Rep.	54.128	*2,73%*
9	Hungary	25.260	*2,55%*	9	Hungary	25.016	*2,51%*	9	Hungary	50.277	*2,53%*
10	South Korea	22.270	*2,25%*	10	Turkey	24.255	*2,44%*	10	Turkey	46.525	*2,34%*
11	Turkey	22.047	*2,23%*	11	Canada	22.329	*2,24%*	11	South Korea	44.376	*2,24%*
12	Taiwan	21.131	*2,14%*	12	Hong Kong	19.915	*2,00%*	12	Canada	41.045	*2,07%*
13	Brazil	17.322	*1,75%*	13	South Korea	17.341	*1,74%*	13	Brazil	34.662	*1,75%*
14	Canada	16.132	*1,63%*	14	Australia	16.583	*1,67%*	14	Taiwan	32.715	*1,65%*
15	South Africa	15.637	*1,58%*	15	Brazil	15.468	*1,55%*	15	Hong Kong	31.105	*1,57%*
16	Malaysia	14.439	*1,46%*	16	Mexico	14.992	*1,51%*	16	South Africa	29.431	*1,48%*
17	Algeria	14.288	*1,44%*	17	U.A.Emirates	14.179	*1,42%*	17	Singapore	28.467	*1,43%*
18	Singapore	13.134	*1,33%*	18	Saudi Arabia	14.179	*1,42%*	18	India	27.313	*1,38%*
19	India	13.041	*1,32%*	19	Singapore	14.166	*1,42%*	19	Saudi Arabia	27.207	*1,37%*
20	Saudi Arabia	12.351	*1,25%*	20	India	13.977	*1,40%*	20	Australia	26.328	*1,33%*
	CC	**119.004**	***12,03%***		**CC**	**132.849**	***13,35%***		**CC**	**251.853**	***12,69%***
(a)	NAFTA	197.890	***20,00%***	(a)	NAFTA	277.916	***27,93%***	(a)	NAFTA	475.807	***23,98%***
(b)	AMLAT	48.508	***4,90%***	(b)	AMLAT	49.306	***4,96%***	(b)	AMLAT	97.814	***4,93%***
(c)	ACCEDING C.	107.088	***10,82%***	(c)	ACCEDING C.	124.649	***12,53%***	(c)	ACCEDING C.	231.737	***11,68%***
(d)	EFTA	107.393	***10,85%***	(d)	EFTA	99.389	***9,99%***	(d)	EFTA	206.781	***10,42%***
(e)	MED	42.964	***4,34%***	(e)	MED	50.205	***5,05%***	(e)	MED	93.169	***4,69%***
(f)	ASEAN	62.332	***6,30%***	(f)	ASEAN	39.192	***3,94%***	(f)	ASEAN	101.524	***5,12%***

Source: International Monetary Fund and Comext Databases

Where:
(a) USA, Canada and Mexico.
(b) Twenty Latin America Countries.
(c) Poland, Hungary, Slovenia, Estonia, Lithuania, Latvia, Czech Rep., Slovakia, Cyprus, Malta and Turkey.
(d) Norway, Switzerland and Iceland.
(e) Malta, Jordan, Turkey, Morocco, Algeria, Tunisia, Egypt, Cyprus, Lebanon, Syria, Israel, Gaza and Jericho.
(f) Thailand, Indonesia, Malaysia, Brunei, Singapore, Philippines, Laos, Cambodia, Myanmar and Vietnam.

Table III-6 – Detailed External Trade of the CC (2002)

A. Cohesion Countries Main Partners

IMPORTS				EXPORTS				IMPORTS+EXPORTS			
Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World
CC: TRADE WITH MAIN PARTNERS IN 2002 (Mio euro)											
	WORLD	**282.148**	***100,00%***		**WORLD**	**240.002**	***100,00%***		**WORLD**	**522.150**	***100,00%***
1	Germany	43.229	*15,32%*	1	United Kingdom	38.993	*16,25%*	1	United Kingdom	77.421	*14,83%*
2	France	38.692	*13,71%*	2	France	34.175	*14,24%*	2	France	72.867	*13,96%*
3	United Kingdom	38.428	*13,62%*	3	Germany	28.282	*11,78%*	3	Germany	71.511	*13,70%*
4	Italy	23.196	*8,22%*	4	United States	23.985	*9,99%*	4	Italy	41.613	*7,97%*
5	United States	17.187	*6,09%*	5	Belgium	18.445	*7,69%*	5	United States	41.172	*7,89%*
6	The Netherlands	14.467	*5,13%*	6	Italy	18.417	*7,67%*	6	Belgium	28.412	*5,44%*
7	Belgium	9.967	*3,53%*	7	The Netherlands	9.147	*3,81%*	7	The Netherlands	23.614	*4,52%*
8	China	6.889	*2,44%*	8	Switzerland	4.770	*1,99%*	8	Japan	10.235	*1,96%*
9	Japan	6.612	*2,34%*	9	Japan	3.623	*1,51%*	9	Switzerland	8.769	*1,68%*
10	Russia	5.460	*1,94%*	10	Sweden	2.928	*1,22%*	10	China	8.364	*1,60%*
11	South Korea	4.883	*1,73%*	11	Mexico	2.870	*1,20%*	11	Russia	6.850	*1,31%*
12	Switzerland	3.999	*1,42%*	12	Turkey	2.255	*0,94%*	12	Sweden	6.426	*1,23%*
13	Sweden	3.498	*1,24%*	13	Morocco	1.898	*0,79%*	13	South Korea	5.939	*1,14%*
14	Algeria	3.246	*1,15%*	14	Danmark	1.878	*0,78%*	14	Mexico	4.761	*0,91%*
15	Saudi Arabia	2.928	*1,04%*	15	Austria	1.848	*0,77%*	15	Austria	4.708	*0,90%*
16	Austria	2.860	*1,01%*	16	Poland	1.824	*0,76%*	16	Danmark	4.674	*0,90%*
17	Danmark	2.796	*0,99%*	17	China	1.475	*0,61%*	17	Turkey	4.611	*0,88%*
18	Turkey	2.356	*0,84%*	18	Russia	1.390	*0,58%*	18	Saudi Arabia	4.240	*0,81%*
19	Brasil	2.206	*0,78%*	19	Singapore	1.390	*0,58%*	19	Algeria	4.098	*0,78%*
20	Finland	2.166	*0,77%*	20	Australia	1.379	*0,57%*	20	Brasil	3.540	*0,68%*
21	Taiwan	2.161	*0,77%*	21	Canada	1.363	*0,57%*	21	Morocco	3.383	*0,65%*
22	Nigeria	2.026	*0,72%*	22	Brasil	1.334	*0,56%*	22	Poland	3.171	*0,61%*
23	Libya	1.931	*0,68%*	23	Saudi Arabia	1.312	*0,55%*	23	Norway	3.150	*0,60%*
24	Norway	1.900	*0,67%*	24	Norway	1.250	*0,52%*	24	Finland	3.113	*0,60%*
25	Mexico	1.891	*0,67%*	25	Hong-Kong	1.149	*0,48%*	25	Taiwan	2.819	*0,54%*
26	Argentina	1.749	*0,62%*	26	Israel	1.124	*0,47%*	26	Canada	2.562	*0,49%*
27	Indonesia	1.529	*0,54%*	27	Czech Rep.	1.114	*0,46%*	27	Singapore	2.430	*0,47%*
28	Morocco	1.485	*0,53%*	28	South Korea	1.056	*0,44%*	28	Nigeria	2.429	*0,47%*
29	India	1.460	*0,52%*	29	Malaysia	991	*0,41%*	29	Czech Rep.	2.304	*0,44%*
30	Iran	1.382	*0,49%*	30	Finland	947	*0,39%*	30	Libya	2.136	*0,41%*
31	Poland	1.347	*0,48%*	31	Hungary	934	*0,39%*	31	Argentina	2.103	*0,40%*
32	Canada	1.199	*0,42%*	32	Algeria	852	*0,35%*	32	Australia	2.064	*0,40%*
33	South Africa	1.198	*0,42%*	33	Uted. Arab Emira	780	*0,32%*	33	Malaysia	2.023	*0,39%*
34	Czech Rep.	1.190	*0,42%*	34	Bulgaria	762	*0,32%*	34	India	2.011	*0,39%*
35	Thailand	1.118	*0,40%*	35	South Africa	719	*0,30%*	35	Hungary	1.934	*0,37%*
36	Singapore	1.040	*0,37%*	36	Taiwan	658	*0,27%*	36	South Africa	1.917	*0,37%*
37	Malaysia	1.032	*0,37%*	37	Venezuela	639	*0,27%*	37	Israel	1.874	*0,36%*
38	Ukraine	1.022	*0,36%*	38	Romania	624	*0,26%*	38	Hong-Kong	1.763	*0,34%*
39	Hungary	1.000	*0,35%*	39	Tunisia	617	*0,26%*	39	Indonesia	1.761	*0,34%*
40	Venezuela	867	*0,31%*	40	Slovakia	575	*0,24%*	40	Iran	1.745	*0,33%*
41	Israel	750	*0,27%*	41	India	551	*0,23%*	41	Venezuela	1.506	*0,29%*
42	Australia	685	*0,24%*	42	Egypt	512	*0,21%*	42	Thailand	1.466	*0,28%*
43	Romania	683	*0,24%*	43	Chile	504	*0,21%*	43	Bulgaria	1.346	*0,26%*
44	Hong-Kong	614	*0,22%*	44	Philippines	492	*0,20%*	44	Romania	1.307	*0,25%*
45	Irak	609	*0,22%*	45	Slovenia	424	*0,18%*	45	Ukraine	1.244	*0,24%*
	EU11 + CEEC	**187.136**	***66,33%***		**EU11 + CEEC**	**165.575**	***68,99%***		**EU11 + CEEC**	**352.711**	***67,55%***
	EU11	**181.012**	***64,15%***		**EU11**	**157.633**	***65,68%***		**EU11**	**338.645**	***64,86%***
	CEEC	**6.124**	***2,17%***		**CEEC**	**7.942**	***3,31%***		**CEEC**	**14.066**	***2,69%***
(a)	CEI	7.177	***2,54%***	(a)	CEI	1.813	***0,76%***	(a)	CEI	8.990	***1,72%***
(b)	MED	9.332	***3,31%***	(b)	MED	8.887	***3,70%***	(b)	MED	18.219	***3,49%***
(c)	MERCOSUR	4.231	***1,50%***	(c)	MERCOSUR	1.834	***0,76%***	(c)	MERCOSUR	6.065	***1,16%***
(d)	OPEP	14.987	***5,31%***	(d)	OPEP	5.180	***2,16%***	(d)	OPEP	20.167	***3,86%***
(e)	ASEAN	10.847	***3,84%***	(e)	ASEAN	5.593	***2,33%***	(e)	ASEAN	16.440	***3,15%***
(f)	ACP	7.095	***2,51%***	(f)	ACP	3.854	***1,61%***	(f)	ACP	10.949	***2,10%***
(g)	NAFTA	20.277	***7,19%***	(g)	NAFTA	28.217	***11,76%***	(g)	NAFTA	48.494	***9,29%***
(h)	EFTA	6.098	***2,16%***	(h)	EFTA	6.104	***2,54%***	(h)	EFTA	12.202	***2,34%***

Source: European Commission's Comext Database.

B. Greece Main Partners

IMPORTS				EXPORTS				IMPORTS+EXPORTS			
Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World
GREECE: TRADE WITH MAIN PARTNERS IN 2002 (Mio euro)											
	WORLD	**33.065**	***100,00%***		**WORLD**	**10.946**	***100,00%***		**WORLD**	**44.011**	***100,00%***
1	Germany	4.029	*12,19%*	1	Germany	1.142	*10,43%*	1	Germany	5.171	*11,75%*
2	Italy	3.804	*11,50%*	2	Italy	929	*8,49%*	2	Italy	4.733	*10,75%*
3	Russia	2.426	*7,34%*	3	United Kingdom	681	*6,22%*	3	Russia	2.736	*6,22%*
4	South Korea	1.971	*5,96%*	4	Bulgaria	586	*5,35%*	4	France	2.270	*5,16%*
5	France	1.879	*5,68%*	5	United States	579	*5,29%*	5	United States	2.133	*4,85%*
6	The Netherlands	1.844	*5,58%*	6	France	391	*3,57%*	6	The Netherlands	2.103	*4,78%*
7	United States	1.554	*4,70%*	7	Turkey	369	*3,37%*	7	United Kingdom	2.026	*4,60%*
8	Belgium	1.439	*4,35%*	8	Russia	310	*2,83%*	8	South Korea	2.004	*4,55%*
9	United Kingdom	1.345	*4,07%*	9	Romania	298	*2,72%*	9	Belgium	1.555	*3,53%*
10	Spain	1.274	*3,85%*	10	Spain	275	*2,51%*	10	Spain	1.549	*3,52%*
11	China	1.023	*3,09%*	11	The Netherlands	259	*2,37%*	11	China	1.083	*2,46%*
12	Japan	998	*3,02%*	12	India	131	*1,20%*	12	Japan	1.052	*2,39%*
13	Saudi Arabia	934	*2,82%*	13	Israel	129	*1,18%*	13	Saudi Arabia	1.024	*2,33%*
14	Turkey	631	*1,91%*	14	Poland	122	*1,11%*	14	Turkey	1.000	*2,27%*
15	Switzerland	496	*1,50%*	15	Belgium	116	*1,06%*	15	Bulgaria	915	*2,08%*
16	Iran	487	*1,47%*	16	Sweden	99	*0,90%*	16	Romania	640	*1,45%*
17	Sweden	391	*1,18%*	17	Libya	99	*0,90%*	17	Switzerland	588	*1,34%*
18	Romania	342	*1,03%*	18	Switzerland	92	*0,84%*	18	Iran	496	*1,13%*
19	Denmark	333	*1,01%*	19	Saudi Arabia	90	*0,82%*	19	Sweden	490	*1,11%*
20	Bulgaria	329	*1,00%*	20	Uted. Arab Emir.	79	*0,72%*	20	Denmark	405	*0,92%*
21	Ukrania	325	*0,98%*	21	Austria	79	*0,72%*	21	Ukrania	403	*0,92%*
22	Finland	311	*0,94%*	22	Ukrania	78	*0,71%*	22	Finland	348	*0,79%*
23	Austria	256	*0,77%*	23	Canada	74	*0,68%*	23	Libya	340	*0,77%*
24	Libya	241	*0,73%*	24	Denmark	72	*0,66%*	24	Austria	335	*0,76%*
25	Ireland	212	*0,64%*	25	Hungary	71	*0,65%*	25	India	320	*0,73%*
26	India	189	*0,57%*	26	Portugal	67	*0,61%*	26	Israel	293	*0,67%*
27	Czech Rep.	179	*0,54%*	27	Australia	64	*0,58%*	27	Poland	265	*0,60%*
28	Egypt	168	*0,51%*	28	Czech Rep.	63	*0,58%*	28	Czech Rep.	242	*0,55%*
29	Israel	164	*0,50%*	29	Egypt	63	*0,58%*	29	Ireland	239	*0,54%*
30	Taiwan	163	*0,49%*	30	China	60	*0,55%*	30	Egypt	231	*0,52%*
31	Thailand	149	*0,45%*	31	Singapore	57	*0,52%*	31	Hungary	204	*0,46%*
32	Poland	143	*0,43%*	32	Japan	54	*0,49%*	32	Taiwan	176	*0,40%*
33	Hungary	133	*0,40%*	33	Hong-Kong	53	*0,48%*	33	Irak	168	*0,38%*
34	Irak	121	*0,37%*	34	Tunisia	49	*0,45%*	34	Thailand	160	*0,36%*
35	Indonesia	109	*0,33%*	35	Irak	47	*0,43%*	35	Indonesia	125	*0,28%*
	EU25	**18.710**	***56,59%***		**EU25**	**6.920**	***63,22%***		**EU25**	**25.630**	***58,24%***
	EU15	**17.248**	***52,16%***		**EU15**	**4.791**	***43,77%***		**EU15**	**22.039**	***50,08%***
	CEEC	**1.462**	***4,42%***		**CEEC**	**2.129**	***19,45%***		**CEEC**	**3.591**	***8,16%***
	CC	**1.570**	***4,75%***		**CC**	**369**	***3,37%***		**CC**	**1.939**	***4,41%***
(a)	CEI	3.088	***9,34%***	(a)	CEI	466	***4,26%***	(a)	CEI	3.554	***8,08%***
(b)	MED	1.250	***3,78%***	(b)	MED	1.432	***13,08%***	(b)	MED	2.682	***6,09%***
(c)	MERCOSUR	332	***1,00%***	(c)	MERCOSUR	27	***0,25%***	(c)	MERCOSUR	359	***0,82%***
(d)	OPEP	2.023	***6,12%***	(d)	OPEP	435	***3,97%***	(d)	OPEP	2.458	***5,58%***
(e)	ASEAN	2.480	***7,50%***	(e)	ASEAN	174	***1,59%***	(e)	ASEAN	2.654	***6,03%***
(f)	ACP	420	***1,27%***	(f)	ACP	188	***1,72%***	(f)	ACP	608	***1,38%***
(g)	NAFTA	1.670	***5,05%***	(g)	NAFTA	680	***6,21%***	(g)	NAFTA	2.350	***5,34%***
(h)	EFTA	591	***1,79%***	(h)	EFTA	132	***1,21%***	(h)	EFTA	723	***1,64%***

Source: European Commission's Comext Database.

Where:
(a) Countries belonging to the Independant States Community (Former USSR).
(b) Malta, Jordan, Turkey, Morocco, Algeria, Tunisia, Egypt, Cyprus, Lebanon, Syria, Israel, Gaza and Jericho.
(c) Countries belonging to the Free Trade Area known as Mercosur, namely Brazil, Argentina, Uruguay and Paraguay.
(d) Countries belonging to the OPEC.
(e) Thailand, Indonesia, Malaysia, Brunei, Singapore, Philippines, Laos, Cambodia, Myanmar and Vietnam.
(f) Countries belonging to the ACP.
(g) USA, Mexico and Canada.
(h) Norway, Switzerland and Iceland.

C. Ireland Main Partners

IMPORTS				EXPORTS				IMPORTS+EXPORTS			
Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World
IRELAND : TRADE WITH MAIN PARTNERS IN 2002 (Mio euro)											
	WORLD	**55.493**	***100,00%***		**WORLD**	**93.347**	***100,00%***		**WORLD**	**148.840**	***100,00%***
1	United Kingdom	23.265	*41,92%*	1	United Kingdom	22.502	*24,11%*	1	United Kingdom	45.767	*30,75%*
2	United States	8.744	*15,76%*	2	United States	16.090	*17,24%*	2	United States	24.834	*16,69%*
3	Germany	3.765	*6,78%*	3	Belgium	13.542	*14,51%*	3	Belgium	14.536	*9,77%*
4	France	2.097	*3,78%*	4	Germany	6.742	*7,22%*	4	Germany	10.507	*7,06%*
5	The Netherlands	2.058	*3,71%*	5	France	4.684	*5,02%*	5	France	6.781	*4,56%*
6	Japan	1.540	*2,78%*	6	Italy	3.599	*3,86%*	6	The Netherlands	5.543	*3,72%*
7	Taiwan	1.084	*1,95%*	7	The Netherlands	3.485	*3,73%*	7	Italy	4.496	*3,02%*
8	Belgium	994	*1,79%*	8	Switzerland	3.094	*3,31%*	8	Japan	3.998	*2,69%*
9	Italy	897	*1,62%*	9	Japan	2.458	*2,63%*	9	Switzerland	3.675	*2,47%*
10	China	763	*1,37%*	10	Spain	2.241	*2,40%*	10	Spain	2.843	*1,91%*
11	Singapore	720	*1,30%*	11	Sweden	1.200	*1,29%*	11	Sweden	1.578	*1,06%*
12	Denmark	683	*1,23%*	12	Malaysia	765	*0,82%*	12	Singapore	1.457	*0,98%*
13	South Korea	682	*1,23%*	13	Singapore	737	*0,79%*	13	Taiwan	1.426	*0,96%*
14	Norway	653	*1,18%*	14	Australia	655	*0,70%*	14	South Korea	1.317	*0,88%*
15	Spain	602	*1,08%*	15	South Korea	635	*0,68%*	15	China	1.310	*0,88%*
16	Switzerland	581	*1,05%*	16	Saudi Arabia	549	*0,59%*	16	Malaysia	1.295	*0,87%*
17	Malaysia	530	*0,96%*	17	Hong-Kong	549	*0,59%*	17	Denmark	1.229	*0,83%*
18	Canada	418	*0,75%*	18	China	547	*0,59%*	18	Norway	1.166	*0,78%*
19	Sweden	378	*0,68%*	19	Denmark	546	*0,58%*	19	Canada	925	*0,62%*
20	Finland	364	*0,66%*	20	Norway	513	*0,55%*	20	Hong-Kong	806	*0,54%*
21	Hong-Kong	257	*0,46%*	21	Canada	507	*0,54%*	21	Australia	771	*0,52%*
22	Thailand	243	*0,44%*	22	Mexico	467	*0,50%*	22	Finland	668	*0,45%*
23	Austria	219	*0,39%*	23	Portugal	362	*0,39%*	23	Mexico	591	*0,40%*
24	Philippines	181	*0,33%*	24	Philippines	343	*0,37%*	24	Saudi Arabia	573	*0,38%*
25	Turkey	144	*0,26%*	25	Taiwan	342	*0,37%*	25	Austria	555	*0,37%*
26	Hungary	144	*0,26%*	26	Turkey	337	*0,36%*	26	Philippines	524	*0,35%*
27	India	136	*0,25%*	27	Austria	336	*0,36%*	27	Portugal	496	*0,33%*
28	Portugal	134	*0,24%*	28	Greece	330	*0,35%*	28	Turkey	481	*0,32%*
29	Mexico	124	*0,22%*	29	Finland	304	*0,33%*	29	Poland	397	*0,27%*
30	Czech Rep.	119	*0,21%*	30	South Africa	296	*0,32%*	30	South Africa	393	*0,26%*
31	Brasil	118	*0,21%*	31	Poland	284	*0,30%*	31	Greece	366	*0,25%*
32	Australia	116	*0,21%*	32	Russia	258	*0,28%*	32	Thailand	355	*0,24%*
33	Poland	113	*0,20%*	33	Israel	245	*0,26%*	33	Israel	322	*0,22%*
34	South Africa	97	*0,17%*	34	Czech Rep.	198	*0,21%*	34	Czech Rep.	317	*0,21%*
35	Indonesia	81	*0,15%*	35	Uted. Arab Emir.	176	*0,19%*	35	Russia	288	*0,19%*
	EU25	**37.218**	***67,07%***		**EU25**	**61.633**	***66,03%***		**EU25**	**98.851**	***66,41%***
	EU15	**36.680**	***66,10%***		**EU15**	**60.733**	***65,06%***		**EU15**	**97.413**	***65,45%***
	CEEC	**538**	***0,97%***		**CEEC**	**900**	***0,96%***		**CEEC**	**1.438**	***0,97%***
	CC	**772**	***1,39%***		**CC**	**2.933**	***3,14%***		**CC**	**3.705**	***2,49%***
(a)	CEI	41	***0,07%***	(a)	CEI	298	***0,32%***	(a)	CEI	339	***0,23%***
(b)	MED	294	***0,53%***	(b)	MED	940	***1,01%***	(b)	MED	1.234	***0,83%***
(c)	MERCOSUR	165	***0,30%***	(c)	MERCOSUR	175	***0,19%***	(c)	MERCOSUR	340	***0,23%***
(d)	OPEP	139	***0,25%***	(d)	OPEP	1.053	***1,13%***	(d)	OPEP	1.192	***0,80%***
(e)	ASEAN	3.516	***6,34%***	(e)	ASEAN	3.139	***3,36%***	(e)	ASEAN	6.655	***4,47%***
(f)	ACP	254	***0,46%***	(f)	ACP	665	***0,71%***	(f)	ACP	919	***0,62%***
(g)	NAFTA	9.286	***16,73%***	(g)	NAFTA	17.064	***18,28%***	(g)	NAFTA	26.350	***17,70%***
(h)	EFTA	1.238	***2,23%***	(h)	EFTA	3.643	***3,90%***	(h)	EFTA	4.881	***3,28%***

Source: European Commission's Comext Database.

D. Portugal Main Partners

IMPORTS				EXPORTS				IMPORTS+EXPORTS			
Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World
PORTUGAL : TRADE WITH MAIN PARTNERS IN 2002 (Mio euro)											
	WORLD	**42.414**	***100,00%***		**WORLD**	**28.098**	***100,00%***		**WORLD**	**70.512**	***100,00%***
1	Spain	12.254	*28,89%*	1	Spain	5.768	*20,53%*	1	Spain	18.022	*25,56%*
2	Germany	6.325	*14,91%*	2	Germany	5.081	*18,08%*	2	Germany	11.406	*16,18%*
3	France	4.347	*10,25%*	3	France	3.751	*13,35%*	3	France	8.098	*11,48%*
4	Italy	2.857	*6,74%*	4	United Kingdom	2.948	*10,49%*	4	United Kingdom	5.155	*7,31%*
5	United Kingdom	2.207	*5,20%*	5	United States	1.571	*5,59%*	5	Italy	4.195	*5,95%*
6	The Netherlands	1.938	*4,57%*	6	Italy	1.338	*4,76%*	6	The Netherlands	3.031	*4,30%*
7	Belgium	1.298	*3,06%*	7	Belgium	1.264	*4,50%*	7	Belgium	2.562	*3,63%*
8	United States	883	*2,08%*	8	The Netherlands	1.093	*3,89%*	8	United States	2.454	*3,48%*
9	Japan	721	*1,70%*	9	Sweden	414	*1,47%*	9	Sweden	908	*1,29%*
10	Brasil	657	*1,55%*	10	Switzerland	295	*1,05%*	10	Brasil	821	*1,16%*
11	Nigeria	556	*1,31%*	11	Denmark	278	*0,99%*	11	Japan	815	*1,16%*
12	Sweden	494	*1,16%*	12	Austria	217	*0,77%*	12	Norway	686	*0,97%*
13	Norway	476	*1,12%*	13	Norway	210	*0,75%*	13	Switzerland	657	*0,93%*
14	Poland	372	*0,88%*	14	Brasil	164	*0,58%*	14	Nigeria	585	*0,83%*
15	Switzerland	362	*0,85%*	15	Ireland	160	*0,57%*	15	Denmark	553	*0,78%*
16	Russia	358	*0,84%*	16	Poland	140	*0,50%*	16	Austria	522	*0,74%*
17	Saudi Arabia	348	*0,82%*	17	Canada	140	*0,50%*	17	Poland	512	*0,73%*
18	China	345	*0,81%*	18	Australia	125	*0,44%*	18	Ireland	449	*0,64%*
19	Austria	305	*0,72%*	19	Finland	122	*0,43%*	19	China	426	*0,60%*
20	Ireland	289	*0,68%*	20	Singapore	122	*0,43%*	20	Saudi Arabia	404	*0,57%*
21	Denmark	275	*0,65%*	21	Morocco	119	*0,42%*	21	Russia	390	*0,55%*
22	Turkey	257	*0,61%*	22	Turkey	108	*0,38%*	22	Finland	372	*0,53%*
23	Finland	250	*0,59%*	23	Greece	101	*0,36%*	23	Turkey	365	*0,52%*
24	South Korea	243	*0,57%*	24	Japan	94	*0,33%*	24	South Korea	264	*0,37%*
25	Algeria	197	*0,46%*	25	Hungary	90	*0,32%*	25	Mexico	245	*0,35%*
26	India	196	*0,46%*	26	China	81	*0,29%*	26	Algeria	237	*0,34%*
27	Mexico	172	*0,41%*	27	Israel	78	*0,28%*	27	Czech Rep.	224	*0,32%*
28	Argentina	172	*0,41%*	28	Mexico	73	*0,26%*	28	Canada	222	*0,31%*
29	Czech Rep.	165	*0,39%*	29	Hong-Kong	69	*0,25%*	29	India	213	*0,30%*
30	Iran	152	*0,36%*	30	South Africa	60	*0,21%*	30	Argentina	198	*0,28%*
31	South Africa	125	*0,29%*	31	Czech Rep.	59	*0,21%*	31	Greece	193	*0,27%*
32	Venezuela	123	*0,29%*	32	Saudi Arabia	56	*0,20%*	32	Morocco	189	*0,27%*
33	Taiwan	114	*0,27%*	33	Malaysia	53	*0,19%*	33	South Africa	185	*0,26%*
34	Indonesia	102	*0,24%*	34	Chile	45	*0,16%*	34	Australia	184	*0,26%*
35	Luxembourg	101	*0,24%*	35	Algeria	40	*0,14%*	35	Iran	163	*0,23%*
	EU25	**33.862**	***79,84%***		**EU25**	**22.982**	***81,79%***		**EU25**	**56.844**	***80,62%***
	EU15	**33.034**	***77,88%***		**EU15**	**22.570**	***80,33%***		**EU15**	**55.604**	***78,86%***
	CEEC	**828**	***1,95%***		**CEEC**	**412**	***1,47%***		**CEEC**	**1.240**	***1,76%***
	CC	**12.635**	***29,79%***		**CC**	**6.029**	***21,46%***		**CC**	**18.664**	***26,47%***
(a)	CEI	462	***1,09%***	(a)	CEI	50	***0,18%***	(a)	CEI	512	***0,73%***
(b)	MED	728	***1,72%***	(b)	MED	453	***1,61%***	(b)	MED	1.181	***1,67%***
(c)	MERCOSUR	844	***1,99%***	(c)	MERCOSUR	196	***0,70%***	(c)	MERCOSUR	1.040	***1,47%***
(d)	OPEP	1.639	***3,86%***	(d)	OPEP	196	***0,70%***	(d)	OPEP	1.835	***2,60%***
(e)	ASEAN	564	***1,33%***	(e)	ASEAN	300	***1,07%***	(e)	ASEAN	864	***1,23%***
(f)	ACP	1.284	***3,03%***	(f)	ACP	1.019	***3,63%***	(f)	ACP	2.303	***3,27%***
(g)	NAFTA	1.137	***2,68%***	(g)	NAFTA	1.783	***6,35%***	(g)	NAFTA	2.920	***4,14%***
(h)	EFTA	928	***2,19%***	(h)	EFTA	516	***1,84%***	(h)	EFTA	1.444	***2,05%***

Source: European Commission's Comext Database.

E. Spain Main Partners

IMPORTS				EXPORTS				IMPORTS+EXPORTS			
Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World	Rank.	Partners	Mio euro	% World
SPAIN : TRADE WITH MAIN PARTNERS IN 2002 (Mio euro)											
	WORLD	**174.604**	***100,00%***		**WORLD**	**132.918**	***100,00%***		**WORLD**	**307.522**	***100,00%***
1	France	30.369	*17,39%*	1	France	25.349	*19,07%*	1	France	55.718	*18,12%*
2	Germany	29.110	*16,67%*	2	Germany	15.317	*11,52%*	2	Germany	44.427	*14,45%*
3	Italy	15.638	*8,96%*	3	Portugal	13.560	*10,20%*	3	Italy	28.189	*9,17%*
4	United Kingdom	11.611	*6,65%*	4	United Kingdom	12.862	*9,68%*	4	United Kingdom	24.473	*7,96%*
5	The Netherlands	8.627	*4,94%*	5	Italy	12.551	*9,44%*	5	Portugal	19.030	*6,19%*
6	Belgium	6.236	*3,57%*	6	United States	5.745	*4,32%*	6	The Netherlands	12.937	*4,21%*
7	United States	6.006	*3,44%*	7	The Netherlands	4.310	*3,24%*	7	United States	11.751	*3,82%*
8	Portugal	5.470	*3,13%*	8	Belgium	3.523	*2,65%*	8	Belgium	9.759	*3,17%*
9	China	4.758	*2,73%*	9	Mexico	2.303	*1,73%*	9	China	5.545	*1,80%*
10	Japan	3.353	*1,92%*	10	Morocco	1.640	*1,23%*	10	Japan	4.370	*1,42%*
11	Algeria	2.963	*1,70%*	11	Greece	1.566	*1,18%*	11	Mexico	3.881	*1,26%*
12	Russia	2.646	*1,52%*	12	Turkey	1.441	*1,08%*	12	Switzerland	3.849	*1,25%*
13	Ireland	2.572	*1,47%*	13	Switzerland	1.289	*0,97%*	13	Algeria	3.712	*1,21%*
14	Switzerland	2.560	*1,47%*	14	Poland	1.278	*0,96%*	14	Sweden	3.450	*1,12%*
15	Sweden	2.235	*1,28%*	15	Austria	1.216	*0,91%*	15	Russia	3.436	*1,12%*
16	Austria	2.080	*1,19%*	16	Sweden	1.215	*0,91%*	16	Ireland	3.422	*1,11%*
17	South Korea	1.987	*1,14%*	17	Japan	1.017	*0,77%*	17	Austria	3.296	*1,07%*
18	Libya	1.631	*0,93%*	18	Brasil	1.015	*0,76%*	18	Morocco	2.979	*0,97%*
19	Saudi Arabia	1.622	*0,93%*	19	Denmark	982	*0,74%*	19	Turkey	2.765	*0,90%*
20	Mexico	1.578	*0,90%*	20	Ireland	850	*0,64%*	20	Denmark	2.487	*0,81%*
21	Denmark	1.505	*0,86%*	21	Czech Rep.	794	*0,60%*	21	South Korea	2.354	*0,77%*
22	Nigeria	1.469	*0,84%*	22	Russia	790	*0,59%*	22	Brasil	2.347	*0,76%*
23	Argentina	1.445	*0,83%*	23	China	787	*0,59%*	23	Saudi Arabia	2.239	*0,73%*
24	Morocco	1.339	*0,77%*	24	Algeria	749	*0,56%*	24	Poland	1.997	*0,65%*
25	Brasil	1.332	*0,76%*	25	Israel	672	*0,51%*	25	Greece	1.975	*0,64%*
26	Turkey	1.324	*0,76%*	26	Canada	642	*0,48%*	26	Argentina	1.744	*0,57%*
27	Finland	1.241	*0,71%*	27	Hungary	630	*0,47%*	27	Finland	1.725	*0,56%*
28	Indonesia	1.237	*0,71%*	28	Saudi Arabia	617	*0,46%*	28	Libya	1.681	*0,55%*
29	India	939	*0,54%*	29	Venezuela	594	*0,45%*	29	Nigeria	1.669	*0,54%*
30	South Africa	933	*0,53%*	30	Australia	535	*0,40%*	30	Czech Rep.	1.521	*0,49%*
31	Taiwan	800	*0,46%*	31	Tunisia	525	*0,39%*	31	Indonesia	1.395	*0,45%*
32	Iran	741	*0,42%*	32	Uted. Arab Emir.	500	*0,38%*	32	Venezuela	1.309	*0,43%*
33	Czech Rep.	727	*0,42%*	33	Slovakia	492	*0,37%*	33	South Africa	1.284	*0,42%*
34	Poland	719	*0,41%*	34	Norway	490	*0,37%*	34	Hungary	1.281	*0,42%*
35	Venezuela	715	*0,41%*	35	Finland	484	*0,36%*	35	Canada	1.242	*0,40%*
	EU25	**120.774**	***69,17%***		**EU25**	**99.347**	***74,74%***		**EU25**	**220.121**	***71,58%***
	EU15	**117.478**	***67,28%***		**EU15**	**94.846**	***71,36%***		**EU15**	**212.324**	***69,04%***
	CEEC	**3.296**	***1,89%***		**CEEC**	**4.501**	***3,39%***		**CEEC**	**7.797**	***2,54%***
	CC	**8.451**	***4,84%***		**CC**	**15.976**	***12,02%***		**CC**	**24.427**	***7,94%***
(a)	CEI	3.586	***2,05%***	(a)	CEI	999	***0,75%***	(a)	CEI	4.585	***1,49%***
(b)	MED	7.060	***4,04%***	(b)	MED	6.062	***4,56%***	(b)	MED	13.122	***4,27%***
(c)	MERCOSUR	2.890	***1,66%***	(c)	MERCOSUR	1.436	***1,08%***	(c)	MERCOSUR	4.326	***1,41%***
(d)	OPEP	11.186	***6,41%***	(d)	OPEP	3.496	***2,63%***	(d)	OPEP	14.682	***4,77%***
(e)	ASEAN	4.287	***2,46%***	(e)	ASEAN	1.980	***1,49%***	(e)	ASEAN	6.267	***2,04%***
(f)	ACP	5.137	***2,94%***	(f)	ACP	1.982	***1,49%***	(f)	ACP	7.119	***2,31%***
(g)	NAFTA	8.184	***4,69%***	(g)	NAFTA	8.690	***6,54%***	(g)	NAFTA	16.874	***5,49%***
(h)	EFTA	3.341	***1,91%***	(h)	EFTA	1.813	***1,36%***	(h)	EFTA	5.154	***1,68%***

Source: European Commission's Comext Database.

Table III-7 - Degree of Openness of the Economy for the year 2002 (in thousands of euro)

	GDP	Exports (X)	Percentage	Imports (M)	Percentage	Total Percentage (X+M)
Belgium	260.011.000	228.582.619	87,91%	211.071.829	81,18%	**169,09%**
Slovakia	25.680.300	15.215.802	59,25%	17.513.300	68,20%	**127,45%**
Estonia	6.904.000	3.637.938	52,69%	5.078.782	73,56%	**126,26%**
Ireland	129.344.300	93.346.658	72,17%	55.492.613	42,90%	**115,07%**
Hungary	68.916.000	36.503.087	52,97%	39.926.922	57,94%	**110,90%**
Luxembourg	22.395.500	10.814.031	48,29%	13.906.768	62,10%	**110,38%**
Netherlands	444.649.000	258.099.039	58,05%	231.878.746	52,15%	**110,19%**
Czech Republic	78.186.700	40.682.036	52,03%	43.005.378	55,00%	**107,04%**
Slovenia	23.346.700	10.962.012	46,95%	11.574.069	49,57%	**96,53%**
Lithuania	14.672.400	5.536.793	37,74%	7.958.412	54,24%	**91,98%**
Bulgaria	16.583.000	6.062.850	36,56%	8.411.213	50,72%	**87,28%**
Austria	218.332.800	83.199.002	38,11%	82.803.629	37,93%	**76,03%**
Latvia	8.940.200	2.416.590	27,03%	4.278.805	47,86%	**74,89%**
Romania	48.361.800	14.674.866	30,34%	18.880.832	39,04%	**69,38%**
Denmark	183.124.500	60.802.476	33,20%	53.215.141	29,06%	**62,26%**
Sweden	255.707.400	86.089.922	33,67%	70.731.427	27,66%	**61,33%**
Finland	139.716.000	47.742.349	34,17%	36.186.552	25,90%	**60,07%**
Germany	2.110.400.000	651.259.262	30,86%	518.488.276	24,57%	**55,43%**
Portugal	129.280.100	28.097.906	21,73%	42.413.846	32,81%	**54,54%**
Poland	199.903.600	43.499.273	21,76%	58.480.231	29,25%	**51,01%**
France	1.520.804.000	350.802.898	23,07%	348.204.597	22,90%	**45,96%**
Spain	696.208.000	132.918.115	19,09%	174.603.425	25,08%	**44,17%**
Italy	1.258.349.000	265.365.124	21,09%	256.887.349	20,41%	**41,50%**
Utd. Kingdom	1.658.486.900	296.314.665	17,87%	366.239.981	22,08%	**39,95%**
Greece	141.354.000	10.946.507	7,74%	33.064.597	23,39%	**31,14%**

Source: European Commission's Comext and New Cronos Databases.

Table III-8 – Import Concentration Ratios (1999-2002 Average)

Importing Country	Concentration of Imports Index	More Imported Product	2nd More Imported Product	3rd More Imported Product
Hungary	51,87%	85 - Electrical Machinery and Equipment - 23,74%	84 - Machinery and Mechanical Appliances - 20,13%	87 - Vehicles other than railway or tramway - 7,99%
Ireland	49,82%	84 - Machinery and Mechanical Appliances - 23,97%	85 - Electrical Machinery and Equipment - 19,47%	87 - Vehicles other than railway or tramway - 6,38%
Finland	43,11%	85 - Electrical Machinery and Equipment - 18,15%	84 - Machinery and Mechanical Appliances - 14,19%	27 - Mineral fuels and oils - 10,77%
Netherlands	41,12%	84 - Machinery and Mechanical Appliances - 18,43%	85 - Electrical Machinery and Equipment - 13,04%	27 - Mineral fuels and oils - 9,65%
Estonia	40,87%	85 - Electrical Machinery and Equipment - 23,08%	84 - Machinery and Mechanical Appliances - 10,11%	87 - Vehicles other than railway or tramway - 7,68%
Czech Republi	40,76%	84 - Machinery and Mechanical Appliances - 16,81%	85 - Electrical Machinery and Equipment - 15,61%	27 - Mineral fuels and oils - 8,35%
Utd. Kingdom	40,51%	84 - Machinery and Mechanical Appliances - 15,94%	85 - Electrical Machinery and Equipment - 12,68%	87 - Vehicles other than railway or tramway - 11,88%
Slovakia	40,38%	27 - Mineral fuels and oils - 14,83%	84 - Machinery and Mechanical Appliances - 14,11%	87 - Vehicles other than railway or tramway - 11,44%
Spain	40,10%	87 - Vehicles other than railway or tramway - 16,82%	84 - Machinery and Mechanical Appliances - 12,59%	27 - Mineral fuels and oils - 10,69%
Sweden	39,95%	84 - Machinery and Mechanical Appliances - 15,37%	85 - Electrical Machinery and Equipment - 14,69%	87 - Vehicles other than railway or tramway - 9,89%
Austria	39,35%	84 - Machinery and Mechanical Appliances - 14,49%	85 - Electrical Machinery and Equipment - 13,12%	87 - Vehicles other than railway or tramway - 11,74%
Bulgaria	39,28%	99 - Other Products - 19,91%	84 - Machinery and Mechanical Appliances - 11,51%	87 - Vehicles other than railway or tramway - 7,86%
Lithuania	38,02%	27 - Mineral fuels and oils - 19,28%	84 - Machinery and Mechanical Appliances - 9,99%	87 - Vehicles other than railway or tramway - 8,76%
Luxembourg	36,53%	84 - Machinery and Mechanical Appliances - 14,41%	85 - Electrical Machinery and Equipment - 12,66%	87 - Vehicles other than railway or tramway - 9,46%
Fr Germany	36,20%	84 - Machinery and Mechanical Appliances - 14,67%	85 - Electrical Machinery and Equipment - 11,98%	87 - Vehicles other than railway or tramway - 9,55%
Poland	36,05%	84 - Machinery and Mechanical Appliances - 15,73%	85 - Electrical Machinery and Equipment - 10,89%	27 - Mineral fuels and oils - 9,42%
Portugal	35,68%	87 - Vehicles other than railway or tramway - 14,28%	84 - Machinery and Mechanical Appliances - 11,30%	85 - Electrical Machinery and Equipment - 10,10%
Romania	34,95%	84 - Machinery and Mechanical Appliances - 11,99%	27 - Mineral fuels and oils - 11,63%	85 - Electrical Machinery and Equipment - 11,33%
France	34,42%	84 - Machinery and Mechanical Appliances - 14,90%	85 - Electrical Machinery and Equipment - 9,90%	87 - Vehicles other than railway or tramway - 9,61%
Slovenia	33,95%	84 - Machinery and Mechanical Appliances - 12,80%	87 - Vehicles other than railway or tramway - 11,63%	85 - Electrical Machinery and Equipment - 9,52%
Denmark	33,64%	84 - Machinery and Mechanical Appliances - 14,09%	85 - Electrical Machinery and Equipment - 12,50%	87 - Vehicles other than railway or tramway - 7,05%
Greece	32,52%	27 - Mineral fuels and oils - 12,71%	84 - Machinery and Mechanical Appliances - 10,30%	87 - Vehicles other than railway or tramway - 9,52%
Italy	31,99%	87 - Vehicles other than railway or tramway - 11,80%	84 - Machinery and Mechanical Appliances - 11,45%	27 - Mineral fuels and oils - 8,74%
Latvia	31,86%	84 - Machinery and Mechanical Appliances - 12,33%	27 - Mineral fuels and oils - 10,64%	85 - Electrical Machinery and Equipment - 8,89%
Belgium	30,91%	87 - Vehicles other than railway or tramway - 12,20%	84 - Machinery and Mechanical Appliances - 10,84%	27 - Mineral fuels and oils - 7,87%

Source: European Commission's Comext Database.

Note: Bulgaria presents a high 99-class due to the lack of rigour showed by the frontiers' authorities, which has been even referred by the EUROPEAN COMMISSION (2003c) as one of the aspects to improve for the feasible next enlargement in 2007.

Table III-9 – COS_{ij} mean, maximum and minimum values for exporting countries (1999-2002 Average Period and 6-digit Comext's CN)

Exporting Country	Total Average	Cohesion C. Average	CEEC Average	Rest of EU Avg.	Maximum	Minimum
United Kingdom	0,6237	0,5955	0,5844	**0,6743**	0,7562 - Denmark	0,5014 - Estonia
Germany	0,5997	0,5804	0,5417	**0,6654**	0,7789 - United Kingdom	0,3933 - Romania
Belgium	0,5862	0,5528	0,5731	**0,6128**	0,7517 - Bulgaria	0,3179 - Ireland
Spain	0,5721	0,5869	0,5242	**0,6117**	0,8446 - Portugal	0,2978 - Ireland
Netherlands	0,5619	0,5309	0,5442	**0,5919**	0,7340 - Ireland	0,4206 - Slovakia
Italy	0,5527	0,5357	0,5480	**0,5643**	0,6400 - Portugal	0,3494 - Ireland
Sweden	0,5351	0,4588	**0,5600**	0,5407	0,6834 - Denmark	0,2415 - Ireland
Slovakia	0,5266	0,4809	0,5072	**0,5592**	0,6926 - Bulgaria	0,2365 - Ireland
France	0,4987	0,5032	0,4329	**0,5628**	0,6900 - Germany	0,2944 - Hungary
Czech Republic	0,4960	0,5095	0,4555	**0,5244**	0,6776 - Austria	0,2946 - Ireland
Austria	0,4192	0,3807	0,4144	**0,4395**	0,5407 - Czech Republic	0,2731 - Ireland
Portugal	0,4177	0,3824	0,3605	**0,4794**	0,6461 - Italy	0,2360 - Ireland
Denmark	0,4063	0,3537	**0,4249**	0,4088	0,4987 - Czech Republic	0,3016 - Ireland
Lithuania	0,3992	0,3090	**0,4572**	0,3846	0,7480 - Latvia	0,1758 - Hungary
Hungary	0,3963	0,3793	0,3565	**0,4351**	0,5553 - Germany	0,2667 - Latvia
Greece	0,3639	0,2591	**0,4082**	0,3521	0,6803 - Latvia	0,1762 - Hungary
Bulgaria	0,3401	0,2585	**0,3889**	0,3299	0,6538 - Latvia	0,1464 - Ireland
Finland	0,3379	0,2628	0,3499	**0,3559**	0,5623 - Denmark	0,1702 - Ireland
Slovenia	0,3348	**0,3769**	0,3396	0,3155	0,5457 - Portugal	0,1579 - Ireland
Romania	0,3335	0,2690	**0,3564**	0,3381	0,5474 - Slovenia	0,1903 - Ireland
Ireland	0,3302	0,2509	0,2970	**0,3821**	0,6326 - Netherlands	0,1835 - Slovenia
Poland	0,3036	**0,3231**	0,3043	0,2960	0,4570 - Portugal	0,1328 - Ireland
Estonia	0,2245	0,1564	0,2250	**0,2488**	0,4213 - Finland	0,0869 - Ireland
Luxembourg	0,2090	0,1908	0,1891	**0,2361**	0,2833 - Austria	0,1414 - Estonia
Latvia	0,1155	0,1025	0,1150	**0,1207**	0,2400 - Denmark	0,0558 - Ireland

Source: European Commission's Comext Database.

Table III-10 – COS_{ij} mean, maximum and minimum values for importing countries (1999-2002 Average and 6-digit Comext's CN)

Importing Country	Total Average	Cohesion C. Average	CEEC Average	Rest of EU Avg.	Maximum	Minimum
Denmark	0,4954	0,4493	0,4144	**0,5949**	0,7562 - United Kingdom	0,2400 - Latvia
Austria	0,4851	0,5016	0,4068	**0,5568**	0,7082 - Spain	0,1369 - Latvia
Slovenia	0,4750	**0,4897**	0,4539	0,4868	0,7176 - Lithuania	0,1100 - Latvia
Germany	0,4744	0,5014	0,3879	**0,5502**	0,7354 - United Kingdom	0,1106 - Latvia
Finland	0,4719	0,4385	0,3813	**0,5758**	0,7413 - United Kingdom	0,1027 - Latvia
Sweden	0,4655	0,4460	0,3818	**0,5571**	0,7625 - Germany	0,0969 - Latvia
Latvia	0,4609	0,4575	0,4272	**0,4897**	0,7480 - Lithuania	0,1448 - Luxembourg
Italy	0,4600	**0,5268**	0,3712	0,5220	0,8113 - Spain	0,1442 - Latvia
Poland	0,4598	0,4285	0,3644	**0,5493**	0,6866 - United Kingdom	0,1208 - Latvia
Czech Republic	0,4558	0,4252	0,3730	**0,5348**	0,6584 - Netherlands	0,1161 - Latvia
Bulgaria	0,4448	0,4355	0,3628	**0,5152**	0,7517 - Belgium	0,0892 - Latvia
Portugal	0,4402	0,4775	0,3753	**0,4890**	0,8446 - Spain	0,1127 - Latvia
United Kingdom	0,4378	0,4626	0,3363	**0,5293**	0,7789 - Germany	0,1154 - Latvia
Spain	0,4170	0,3662	0,3361	**0,5045**	0,7534 - Germany	0,0933 - Latvia
Belgium	0,4081	**0,4708**	0,3414	0,4497	0,6443 - Spain	0,1023 - Estonia
Greece	0,4046	0,3938	0,3584	**0,4496**	0,6183 - Spain	0,1481 - Latvia
Lithuania	0,4044	0,3744	0,3221	**0,4825**	0,6923 - Belgium	0,1750 - Luxembourg
Luxembourg	0,3958	0,3873	0,3269	**0,4682**	0,5449 - Germany	0,0693 - Latvia
Estonia	0,3893	0,3565	0,3634	**0,4225**	0,5768 - Sweden	0,1260 - Latvia
Slovakia	0,3830	0,3677	0,3265	**0,4348**	0,6254 - Czech Republic	0,1031 - Latvia
France	0,3664	0,4095	0,2819	**0,4337**	0,6366 - Germany	0,0874 - Latvia
Netherlands	0,3594	**0,4256**	0,2776	0,4147	0,7093 - United Kingdom	0,0985 - Latvia
Romania	0,3573	0,3438	0,2911	**0,4163**	0,5369 - Netherlands	0,0952 - Latvia
Hungary	0,2979	0,2961	0,2210	**0,3615**	0,5119 - United Kingdom	0,0899 - Latvia
Ireland	0,2748	0,2418	0,1963	**0,3552**	0,7340 - Netherlands	0,0558 - Latvia

Source: European Commission's Comext Database.

Note: The highest COS-value achieved between the CEEC, the CC and the EU11 is highlighted in **bold**.

Table III-11 – Yearly average distribution of both Structural and Cohesion Funds (€ Million, 1999 prices)

	2000-2006 Period			2004-2006 Period		
	Total Structural Funds	Objective 1 Regions	Cohesion Fund	Total Structural Funds	Objective 1 Regions	Cohesion Fund
Austria	262	37	-	-	-	-
Belgium	291	89	-	-	-	-
Denmark	118	-	-	-	-	-
Finland	299	130	-	-	-	-
France	2.238	544	-	-	-	-
Germany	4.252	2.851	-	-	-	-
Greece	3.555	2.994	437	-	-	-
Ireland	568	441	103	-	-	-
Italy	4.237	3.160	-	-	-	-
Luxembourg	13	-	-	-	-	-
Portugal	3.251	2.718	437	-	-	-
Spain	8.029	5.442	1.594	-	-	-
Sweden	312	103	-	-	-	-
The Netherlands	469	18	-	-	-	-
Utd. Kingdom	2.371	893	-	-	-	-
Cyprus	-	-	-	18	-	16
Czech Rep.	-	-	-	497	429	279
Estonia	-	-	-	114	110	92
Hungary	-	-	-	618	588	331
Latvia	-	-	-	192	185	154
Lithuania	-	-	-	274	264	181
Malta	-	-	-	20	19	7
Poland	-	-	-	2.545	2.440	1.244
Slovakia	-	-	-	350	307	170
Slovenia	-	-	-	79	70	56

Source: EUROPEAN COMMISSION (2003a, 2003b).

Note: The distribution of the Cohesion Funds for the 2004 EU adherent countries have been calculated taking into account the mean figure of the range presented as their indicative allocation for each country within the period 2004-2006.

Table III-12 – Penetration of FDI in the CEEC and the CC – Annual Inward FDI stock as % of GDP

	2000	2001	2002
Ireland	124,4	133,9	129,1
Estonia	51,5	57,2	65,9
Czech Republic	42,1	47,4	54,8
Slovakia	23,6	30,4	43,2
Hungary	42,5	45,4	38,2
Portugal	26,9	29,9	36,0
Spain	25,8	28,2	33,2
Latvia	29,1	30,4	32,4
Lithuania	20,9	22,2	31,4
Bulgaria	21,6	25,2	24,0
Poland	21,7	22,4	23,9
Slovenia	15,5	16,4	23,1
Romania	17,5	19,0	20,5
Greece	11,2	10,2	9,0

Source: UNCTD (2003).

Table III-13 – Geographical Origin of the Stock of FDI received by recent EU adherent countries (until December 1999)

		(%)
1	Germany	19,4
2	The Netherlands	13,9
3	United States	10,7
4	Austria	7,1
5	France	7,0
6	United Kingdom	5,5
7	Italy	4,8
8	Sweden	2,9
9	Belgium	2,4
10	Switzerland	2,2
11	Korea	2,1
12	Russia	1,6
13	Finland	1,5
14	Denmark	1,4
15	Ireland	1,1
16	Norway	0,9
17	Cyprus	0,9
18	Liechtenstein	0,9
19	Luxembourg	0,5
20	Spain	0,5
	Total EU	68,4
	Total OECD	86,9

Source: MARTÍN *et al.* (2002, pp. 89).

Table III-14 – Average Wages per worker in the manufacturing sector in the CEEC (EU=100)

	2000
EU	100
Spain	73,73
Slovenia	28,58
Poland	17,15
Czech Republic	12,39
Hungary	12,37
Estonia	11,13
Lithuania	10,07
Slovakia	10,04
Latvia	9,17
Romania	4,55
Bulgaria	4,16

Source: MARTÍN *et al.* (2002, pp. 98).

Table III-15 – Percentage of the Total Population Aged 25 to 64 Having Completed at Least Upper Secondary Education

	2001
Czech Rep.	86,3
Estonia	86,1
Slovakia	84,9
Lithuania	84,4
Germany	82,5
Utd. Kingdom	81,1
Sweden	80,5
Poland	80,4
Denmark	80,2
Latvia	79,1
Austria	77,3
Slovenia	75,4
Finland	73,5
Romania	70,5
Hungary	70,1
The Netherlands	66,9
Bulgaria	64,5
France	63,2
Belgium	59,2
Ireland	59,2
Luxembourg	59,2
Greece	51,6
Italy	43,2
Spain	40
Portugal	19,8

Source: EUROPEAN COMMISSION (2003d, 2003e).

Table III-16 – Supply of Qualified Labour Force Index

Ranking	Country	Index	Ranking	Country	Index
1	Phillipines	8.25	17	Netherlands	7.34
2	Iceland	8.23	18	Czech Republic	7.33
3	Austria	8.23	20	Sweden	7.25
4	Singapore	8.09	23	Hungary	7.11
5	USA	8.04	26	Ireland	7.05
6	Slovakia	7.94	34	Poland	6.38
9	Finland	7.77	36	Spain	6.33
10	Denmark	7.72	39	Greece	6.03
15	Belgium	7.46	42	Slovenia	5.31
16	France	7.38	43	Portugal	5.07

Source: IMD (2002).

BIBLIOGRAPHY

ABDALLA, Abdil (1997), "The Impact of Euro-Mediterranean Partnerships on Trade Interests of the Organisation of the Islamic Conference Countries" (Proceedings of the September 18-19th *Conference on the Implications of Regional Economic Groupings for the Economies of the OIC Member Countries*), Ankara, TK.

ABRAMS, R. K. (1980), "International Trade Flows Under Flexible Exchange Rates", *The Economic Review of the Federal Reserve Bank of Kansas City*, Vol. 65 (3), pp. 3-10.

AFRICANO, Ana Paula (2004), "Trade Integration of the Central and Eastern European Countries into the European Union" (Proceedings of the *Second Pan-European Conference by the Standing Group on EU Politics and the European Consortium for Political Research*, held on June 24th-26th), Bologna, IT.

AFRICANO, Ana Paula and TELES, Paulo (2001), "EU Enlargement and Trade Adjustments" (Proceedings of the *European Trade Study Group Conference*, held on the Université Libre de Bruxelles on September 14th-16th), Brussels, BE.

AGHION, Philippe; BURGES, Robin; FITOUSSI, Jean-Paul and MESSERLIN, Patrick A. (1992), "Towards the Establishment of a Continental European Customs Union", in *FLEMMING & ROLLO (eds.) (1992)*, pp. 157-180.

AHN, Seung C. and SCHMIDT, Peter (1999), "Estimation of Linear Panel Data Models Using Generalized Method of Moments", in *MÁTYÁS (ed.) (1999)*, pp. 211-248.

AITKEN, Norman D. (1973), "The Effect of the EEC and EFTA on European Trade: A Temporal Cross-Section Analysis", *The American Economic Review*, Vol. 63 (5), pp. 881-892, December.

AITKEN, Norman D. and OBUTELEWICZ, Robert S. (1976), "A Cross-Sectional Study of EEC Trade with the Association of African Countries", *The Review of Economics and Statistics*, Vol. 58 (4), pp. 425-433.

ALLEN, R.G.D. (1957), *Mathematical Economics*, MacMillan, London, UK.

ALLEN, R.G.D. (1965), *Economía Matemática*, Aguilar S.A. de Ediciones, Madrid, ES.

ANDERSON, James E. (1979), "A Theoretical Foundation for the Gravity Equation", *The American Economic Review,* Vol. 69 (1), pp. 106-116, March.

ANDERSON, James E. and WINCOOP, Eric Van (2003), "Gravity with Gravitas: A Solution to the Border Puzzle", *American Economic Review*, forthcoming.

AQUINO, Antonio (1981), "The Measurement of Intra-Industry Trade when Overall Trade is Imbalanced", *Weltwirtschaftliches Archiv*, Vol. 117, pp. 763-766.

ARCHIBUGI, D. and PIANTA, M. (1992), *The Technological Specialisation of Advanced Countries. A Report to the EEC on International Science and Technology Activities*, Kluwer Academic Publishers, Dortrecht, NL.

ARNON, Arie; SPIVAK, Avia and WEINBLATT, J. (1996), "The Potential for Trade Between Israel, the Palestinians and Jordan", *The World Economy*, Vol. 19 (1), pp. 113-134.

BALASSA, Bela (1965), "Trade Liberalization and Revealed Comparative Advantage", *The Manchester School of Economic and Social Studies*, Vol. 32, pp. 99-123.

BALDWIN, Richard E. (1988), "Hysteresis in Import Prices: The Beachhead Effect", *The American Economic Review*, Vol. 74, pp. 773-785.

BALDWIN, Richard E. (1993), "The Potential for Trade Between Countries of EFTA and Central and Eastern Europe", *EFTA Occasional Paper*, Vol. 44, Geneva, CH.

BALDWIN, Richard E. (1994), *Towards an Integrated Europe*, Centre for Economic Policy Research, London, UK.

BALDWIN, Richard E. (1997), "Comment on Gros and Gonciarz", *European Journal of Political Economy*, Vol. 13 (1), pp. 187-188, February.

BALDWIN, Richard E. and KRUEGER, Anne O. (eds.) (1984), *The Structure and Evolution of Recent US Trade Policy*, National Bureau of Economic Research, The University of Chicago Press, Chicago, IL.

BALDWIN, Richard E. and KRUGMAN, Paul (1989), "Persistent Trade Effects of Exchange Rate Shocks", *Quarterly Journal of Economics*, Vol. 104, pp. 635-654.

BARRY, Frank (2002), "Economic Policy, Income Convergence and Structural Change in the EU Periphery", in *KIERZKOWSKI (ed.) (2002)*, ch. 9.

BAYOUMI, Tamim and EICHENGREEN, Barry (1995), "Is Regionalism Simply a Diversion? Evidence from the Evolution of the EC and EFTA", *National Bureau of Economic Research Working Paper Series*, n. 5283, Cambridge, MA.

BEAN, Charles R. (1987), "Sterling Misalignment and British Trade Performance", *Centre for Economic Policy Research Discussion Paper Series*, n. 177, London, UK.

BEERS, Cees Van and BERGH, Jeroen C.J.M. Van den (1997), "An Empirical Multi-Country Analysis of the Impact of Environment Regulations on Foreign Trade Flows", *Kyklos*, Vol. 50, pp. 29-46.

BEERS, Cees Van and BERGH, Jeroen C.J.M. Van den (2000), "The Impact of Environmental Policy on Foreign Trade", *Tinbergen Institute Discussion Paper* n° TI 2000-069/3, Amsterdam, NL, and Rotterdam, NL.

BEERS, Cees Van and BIESSEN, Guido (1996), "Trade Possibilities and Structure of Foreign Trade: The Case of Hungary and Poland", *Comparative Economic Studies* Vol. 38, nº 2/3 Summer-Fall, pp. 1-20.

BEERS, Cees Van and LINNEMANN, Hans (1992), "Commodity Composition of Trade in Manufactures and South-South Trade Potential", in *LINNEMANN (ed.) (1992)*, pp. 175-201.

BERGSTRAND, Jeffrey H. (1985), "The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence", *The Review of Economics and Statistics*, Vol. 67 (3), pp. 474-481, August.

BERGSTRAND, Jeffrey H. (1989), "The Generalized Gravity Equation, Monopolistic Competition, and the Factor-Proportions Theory in International Trade", *The Review of Economics and Statistics*, Vol. 71 (1), pp. 143-153, February.

BIESSEN, Guido (1991), "Is the Impact of Central Planning on the Level of Foreign Trade Really Negative?", *Journal of Comparative Economics*, Vol. 15 (1), pp. 22-44.

BIKKER, J.A. (1987), "An International Trade Flow with Substitution: An Extension of the Gravity Model", *Kyklos*, Vol. 40, pp. 315-737.

BOISSO, Dale and FERRANTINO, Michael (1993), "Is the World Getting Smaller? A Gravity Export Model for the Whole Planet", *Richard Johnson Centre Working Paper Series*, n. 9225, Department of Economics, Southern Methodist University, Louisiana, LO.

BOISSO, Dale and FERRANTINO, Michael (1996), *Economic and Cultural Distance in International Trade: An Empirical Puzzle*, Manuscript of the US International Trade Commission, Washington D.C.

BOISSO, Dale and FERRANTINO, Michael (1997), "Economic Distance, Cultural Distance and Openness in International Trade: Empirical Puzzles", *Journal of Economic Integration*, Vol. 12, pp. 456-484.

BOUGHEAS, Spiros; DEMETRIADES, Panicos O. and MORGENROTH, Edgar L.W. (1999), "Infrastructure, Transport Costs and Trade", *Journal of International Economics*, Vol. 47, pp. 169-189.

BRADA, Josef C. (ed.) (1976), *Quantitative and Analytical Studies in East-West Economic Relations*, International Development Research Centre, Bloomington, IN

BRADA, Josef C. and MENDEZ, Jose A. (1983), "Regional Economic Integration and the Volume of Intra-Regional Trade: A Comparison of Developed and Developing Country Experience", *Kyklos*, Vol. 36 (4), pp. 589-603.

BRADA, Josef C. and MENDEZ, Jose A. (1985), "Economic Integration Among Developed, Developing and Centrally Planned Economies: A Comparative Analysis", *The Review of Economics and Statistics*, Vol. 67, pp. 549-556, November.

BRADA, Josef C. and MENDEZ, Jose A. (1988), "Exchange Rate Risk, Exchange Rate Regimes and the Level of International Trade", *Kyklos*, Vol. 41 (2), pp. 263-280.

BREUSS, F. and EGGER, P. (1999), "How Reliable are Estimations of East-West Trade Potentials Based on Cross-Section Gravity Analyses?", *Empirica*, Vol. 26 (2), pp. 81-95.

BUCH, Claudia M. and PIAZOLO, Daniel (2000), "Capital and Trade Flows in Europe and the Impact of Enlargement", *Kiel Working Paper Series* n. 1001, Kiel Institute of World Economics, Kiev.

CAMERON, A. C. and TRIVEDI, P. K. (1998), *Regression Analysis of Count Data*, The Cambridge University Press, Cambridge, MA.

CHENG, I-Hui and WALL, Howard J. (2002), "Controlling for Heterogeneity in Gravity Models of Trade", *The Federal Reserve Bank of Saint Louis Working Papers Series*, July 2002, Saint Louis, MO.

CHRISTIE, Edward (2002), "Potential Trade in Southeast Europe: A Gravity Model Approach", *WIIW Working Paper Series* n. 21, The Vienna Institute for International Economic Studies, Vienna, AT.

COLLINS, Susan M. and RODRIK, Dani (1991), *Eastern Europe and the Soviet Union in the World Economy*, Institute for International Economics, 1st Edition, Washington D.C.

CORNETT, Andreas P. and IVERSEN, Soren P. (1998), "The Baltic State in an European and Baltic Perspective: Trade and Transition in the Baltic Rim" (Proceedings of the *Conference Global-Local Interplay in the Baltic Sea Region* on October 1st-4th), Pärnu, EE.

CRÉPON, B.; KRAMARZ, F. and TROGON, A. (1996), "Parameters of Interest, Nuisance Parameter and Orthogonality Conditions: An Application to Error Component Models", *INSEE Discussion Paper* n. 9335, Institut National de la Statistique et des Études Économiques, Paris, FR.

CYRUS, Teresa (1996), "Income in the Gravity Model of Bilateral Trade: Does Endogeneity Matter?", *Department of Economics of the University of California Ph.D. Series*, June, Berkeley, CA.

DEARDORFF, Alan V. (1998), "Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World", in *FRANKEL (ed.) (1998)*, pp. 7-33.

DHAR, Sumana and PANAGARIYA, Arvind (1995), "Is East Asia Less Open than North America and the EEC?", *World Bank Policy Research Working Paper Series* n. 1370, Washington D.C.

DIXIT, A. (1989), "Hysteresis, Import Penetration and Exchange Rate Pass Through", *Quarterly Journal of Economics*, Vol. 104, pp. 205-228.

EATON, Jonathan and TAMURA, Akiko (1994), "Bilateralism and Regionalism in Japanese and US Trade and Direct Foreign Investment Patterns", *Journal of the Japanese and International Economies*, Vol. 8, pp. 478-510, December.

EGGER, Peter (2000), "A note on the Proper Econometric Specification of the Gravity Equation", *Economic Letters*, Vol. 66, pp. 25-31.

EGGER, Peter (2002), "An Econometric View on the Estimation of Gravity Models and the Calculation of Trade Potentials", *The World Economy*, Vol. 25 (2), pp. 297-312.

EICHENGREEN, Barry and IRWIN, Douglas A. (1995), "Trade Blocs, Currency Blocs and the Reorientation of Trade in the 1930s", *Journal of International Economics*, Vol. 38 (1-2), pp. 1-24, February.

EICHENGREEN, Barry and IRWIN, Douglas A. (1998), "The Role of History in Bilateral Trade Flows", in *FRANKEL (ed.) (1998)*, pp. 33-62.

EUROPEAN COMMISSION (2003a), *2002 Annual Report on the Cohesion Funds*, DG REGIO, Brussels, BE.

EUROPEAN COMMISSION (2003b), *2002 Annual Report on the Structural Funds*, DG REGIO, Brussels, BE.

EUROPEAN COMMISSION (2003c), *Rapports réguliers sur le progrès accomplis par la Bulgarie, la Roumanie et la Turquie*, Dossier Interne de la Commission Européenne, Bruxelles, BE.

EUROPEAN COMMISSION (2003d), *2003 Statistical Yearbook*, Eurostat, Luxembourg, LU.

EUROPEAN COMMISSION (2003e), *2003 Statistical Yearbook on Candidate Countries*, Eurostat, Luxembourg, LU.

EVENETT, Simon J. and KELLER, Wolfgang (2002), "On Theories Explaining the Success of the Gravity Equation", *Journal of Political Economy*, Vol. 110 (1), pp. 281-316, February.

FEENSTRA, Robert C.; LIPSEY, R.E. and BOWEN, H.P. (1997), "World Trade Flows, 1970-1992, with Production and Tariff Data", *National Bureau of Economic Research Working Paper Series*, n. 5910, Cambridge, MA.

FEENSTRA, Robert C.; MARKUSEN, James A. and ROSE, Andrew K. (2001), "Using the Gravity Equation to Differentiate Among Alternative Theories of Trade", *Canadian Journal of Economics*, Vol. 34 (2), pp. 431-447, May.

FINGER, J.M. and KREININ, M.E. (1979), "A Measure of "Export-Similarity" and Its Possible Uses", *The Economic Journal*, Vol. 89, pp. 905-912.

FIDRMUC, Jarko (1999), "Trade Diversion in the 'Lefts-Out' in the Eastward Enlargement of the European Union. The Case of Slovakia", *IAS Transition Economics Series*, n. 8, Institute for Advanced Studies, Vienna, AT.

FLEEMING, John and ROLLO, J.M.C. (eds.) (1992), *Trade, Payments and Adjustment in Central and Eastern Europe*, Royal Institute of International Affairs, 1st Edition, London, UK.

FRANKEL, Jeffrey A. (1993), "Is Japan Creating a Yen Bloc in East Asia and the Pacific?", in *FRANKEL & KAHLER (eds.) (1993)*, ch. 2.

FRANKEL, Jeffrey A. (1997), *Regional Trading Blocs in the World Economic System*, Institute for International Economics, 1st Edition, Washington D.C.

FRANKEL, Jeffrey A. (ed.) (1998), *The Regionalization of the World Economy*, The University of Chicago Press, 1st Edition, Chicago, IL, and London, UK.

FRANKEL, Jeffrey A. and KAHLER, Miles (eds.) (1993), *Regionalism and Rivalry: Japan and the US in Pacific Asia*, The University of Chicago Press, Chicago, IL.

FRANKEL, Jeffrey A. and ROMER, David (1996), "Trade and Growth", *National Bureau of Economic Research Working Paper Series*, n. 5476, Cambridge, MA.

FRANKEL, Jeffrey A.; STEIN, Ernesto and WEI, Shang-Jin (1995), "Trading Blocs and the Americas: The Natural, The Unnatural and the Super-Natural", *Journal of Development Economics*, Vol. 47, pp. 61-95.

FRANKEL, Jeffrey A.; STEIN, Ernesto and WEI, Shang-Jin (1998), "Continental Trading Blocs: Are They Natural or Supernatural?", in *FRANKEL (ed.) (1998)*, pp. 92-120.

FRANKEL, Jeffrey A. and WEI, Shang-Jin (1992), "Yen Bloc or Dollar Bloc: Exchange Rate Policies of the East Asian Economies", *Paper Series* n. 92-08, University of Birmingham, Birmingham, UK.

FRANKEL, Jeffrey A. and WEI, Shang-Jin (1993a), "Emerging Currency Blocs", *Centre for International and Development Economics Research Working Paper Series* n. C93-026, University of California, Berkeley, CA.

FRANKEL, Jeffrey A. and WEI, Shang-Jin (1993b), "Trade Blocs and Currency Blocs", *National Bureau of Economic Research Working Paper Series*, n. 4335, Cambridge, MA.

FRANKEL, Jeffrey A. and WEI, Shang-Jin (1995), "The New Regionalism and Asia: Impact and Options", *The Federal Reserve Bank of Boston's Pacific Basin Working Paper Series*, n. 95-10, Boston, MA.

GARCÍA-MENÉNDEZ, Leandro; MARTÍNEZ-ZARZOSO, Inmaculada and SUÁREZ-BURGUET, Celestino (2000), "Intra-European Foreign Trade of Spanish Regions. Application of Gravity Equation with Transport Costs Data" (Proceedings of the September 15-17th *Second Annual Conference by the European Trade Study Group*), Glasgow, UK.

GARMAN, G.; PETERSEN, J. and GILLIARD, D. (1998), "Economic Integration in the Americas: 1975-1992", *Journal of Applied Business Research*, Vol. 14 (3), pp. 1-12, Paramine, Summer.

GARNAUT, Ross (1994), "Open Regionalism: Its Analytic Basis and Relevance to the International System", *Journal of Asian Economics*, Vol. 5 (2), pp. 273-290, Summer.

GERACI, Vincent J. and PREWO, Wilfried (1977), "Bilateral Trade Flows and Transport Costs", *The Review of Economics and Statistics*, Vol. 59, pp. 67-74.

GLICK, Reuven and ROSE, Andrew K. (2001), "Does a Currency Union Affect Trade? The Time-Series Evidence", *National Bureau of Economic Research Working Paper Series*, n. 8396, Cambridge, MA.

GLIGOROV, Vladimir; HOLZNER, Mario and LANDESMANN Michael (2003), "Prospects for Further EU Enlargement: from Divergence to Convergence?", *WIIW Research Report Series* n. 296, The Vienna Institute for International Economic Studies, Vienna, AT.

GOULD, David M. (1994), "Immigrant Links to the Home Country: Empirical Implications for US Bilateral Trade Flows", *The Review of Economics and Statistics*, Vol. 76 (2), pp. 302-316.

GRAUWE, Paul De (1988), "Exchange Rate Variability and the Slowdown in Growth of International Trade", *International Monetary Fund Staff Working Paper Series*, n. 35, pp. 63-84, Washington D.C.

GRAY, Andrew (2001), *http/argray.fateback.com/dist/formula.html*

GREENAWAY, David and MILNER, Chris (1981), "Trade Imbalance Effects in the Measurement of Intra-Industry Trade", *Weltwirtschaftliches Archiv*, Vol. 117, pp. 756-762.

GROS, Daniel and GONCIARZ, Andrzej (1996), "A Note on the Trade Potential of Central and Eastern Europe", *European Journal of Political Economy*, Vol. 12, pp. 709-721.

GRUBEL, H. G. and LLOYD, P. J. (1975), *Intra-Industry Trade*, The MacMillan Press, London, UK.

GRUBER, William H. and VERNON, Raymond. (1970), "The Technology Factor in a World Trade Matrix", in *VERNON (ed.) (1970)*, pp. 233-272.

HAMILTON, Carl B. and WINTERS, L. Alan (1992), "Trade with Eastern Europe", *Economic Policy*, Vol. 14, pp. 77-116, April.

HANSEN, L. (1982), "Large Sample Properties of Generalised Method of Moments Estimators", *Econometrica*, Vol. 50, pp. 1029-1054.

HARRIS, Mark H. and MÁTYÁS, László (1996), "A Comparative Analysis of Different Estimators for Dynamic Panel Data Models", *Monash University Department of Econometrics Working Paper Series* n. 4/96, Victoria.

HARRIS, Mark H. and MÁTYÁS, László (1998), "The Econometrics of Gravity Models", *Melbourne Institute Working Paper Series* n. 5/98, Melbourne.

HARRIS, Mark H. and MÁTYÁS, László (2001), "Modelling Export Flows in the APEC Case: Static and Dynamic Gravity Model Approaches", *Asia Pacific Journal of Economic and Business*, Vol. 5 (1).

HARRIS, Mark N.; KÓNYA, László and MÁTYÁS, László (2000), "Modelling the Impact of Environmental Regulations on Bilateral Trade Flows: OECD, 1990-1996", *Melbourne Institute Working Paper Series* n. 11/00, Melbourne.

HAUSMAN, J.A. (1978), "Specification Tests in Econometrics", *Econometrica*, Vol. 46 (6), pp. 1251-1271.

HAUSMAN, J.A. and TAYLOR, W.E. (1981), "Panel Data and Unobservable Individual Effects", *Econometrica*, Vol. 49 (6), pp. 1377-1398.

HAVEMAN, Jon and HUMMELS, David (2000), "Alternative Hypothesis and the Volume of Trade: Evidence on the Extent of Specialization", *Purdue University Working Paper Series* 2000-004, Centres for International Business Educational and Research, West Lafayette, IN.

HAVRYLYSHYN, Oleg and PRITCHETT, Lant (1991), "European Trade Patterns after the Transition", *Policy, Research and External Affairs Working Paper Series* n. 74, World Bank, Washington D.C.

HEAD, K. and MAYER, T. (2001), "Illusory Border Effects", *University of British Columbia Working Paper*, Vancouver.

HELLIWELL, J. (1996), "Do National Borders Matter for Quebec's Trade?", *Canadian Journal of Economics*, Vol. 29, pp. 507-522.

HELPMAN, E. (1987), "Imperfect Competition and International Trade: Evidence from Fourteen Industrial Countries", *Journal of the Japanese and International Economics*, Vol. 1 (1), pp. 62-81.

HELPMAN, E. and KRUGMAN, P. (1985), *Market Structure and Foreign Trade. Increasing Returns, Imperfect Competition and the International Economy*, The MIT Press, Cambridge, MA.

HENRIOT, A. and INOTAÏ, A. (1998), "What Future for the Integration of the European Union and the Central and Eastern European Countries", in *ZYSMAN & SCHWARTZ (eds.) (1998)*, pp. 99-116.

HEWETT, Edward A. (1976), "A Gravity Model of CME Trade", in *BRADA (ed.) (1976)*, pp. 1-15.

HUFBAUER, G.C. (1970), "The Impact of National Characteristics and Technology on the Commodity Composition of Trade in Manufactured Goods", in *VERNON (ed.) (1970)*, pp. 145-231.

IMD (2002), *2002 World Competitiveness Yearbook*, IMD, Lausanne, CH.

ISARD, Walter (1960), *Methods of Regional Analysis: An Introduction to Regional Science*, John Wiley & Sons, London, UK.

ITO, Takatoshi and KRUEGER, Anne O. (eds.) (1997), *Regionalism Versus Multilateral Trade Arrangements*, The University of Chicago Press, Chicago, IL.

IVERSEN, Soren P. (1998), "The Czech Republic's Reintegration in the European Division of Labour. A Gravity Model Analysis" (Proceedings of the *Conference on Business and Economic Development in Central and Eastern Europe: Implications for Economic Integration into Wider Europe* on September 2nd-3rd), pp. 257-280, Brno, CZ.

JAKAB, Z.M.; KOVACS, M.A. and OSZLAY, A. (2001), "How far has trade integration advanced? An analysis of the actual and potential trade of the three Central and Eastern countries", *Journal of Comparative Economics*, Vol. 29, pp. 276-292**.**

KALBASI, Hassan (2001), "The Gravity Model and Global Trade Flows" (Proceedings of the *2001 EcoMod Summer School by the American Economic Association and by the Econometric Society* on August 16th-28th), Brussels, BE.

KELLMAN, Mitchell and SCHRODER, Tim (1983), "The Export Similarity Index: Some Structural Tests", *The Economic Journal*, Vol. 93, pp. 193-198.

KIERZKOWSKI, Henryk (ed.) (2002), *Europe and Globalisation*, Palgrave-MacMillan, London, UK.

KÖSEKAHYAOĞLU, Levent (1994), "An Analysis of the Similarity Between Exports of Turkey and the European Union-12", *Isparta Süleyman Demirel Üniversitesi Working Paper*, Isparta.

KRUGMAN, Paul (1991), "The Move Toward Free Trade Zones", (Proceedings of the *Federal Reserve of Kansas City Symposium in Policy Implications of Trade and Currency Zones* on August 29th-31th), Jackson Hole, Wyoming.

LAASER, Claus-Friedrich and SCHRADER, Klaus (2002), "European Integration and Changing Trade Patterns: The Case of the Baltic States", *Kiel Working Paper Series* n. 1088, Kiel Institute of World Economics, Kiev.

LAMOTTE, Olivier (2002), "Trade Potential between Yugoslavia and the European Union" (Proceedings of the *7th Conference on Globalisation and Economic Governance held by the European Association for Comparative Economic Studies* on June 6th-8th), Bologna, IT.

LAURSEN, Keld (1998), "Revealed Comparative Advantage and the Alternatives as Measures of International Specialisation", *Danish Research Unit for Industrial Dynamics Working Paper Series*, n. 98-30, Copenhagen, DK.

LEAMER, Edward E. (1974), "The Commodity Composition of International Trade in Manufactures: An Empirical Analysis", *Oxford Economic Papers*, New Series, Vol. 26, pp. 350-374.

LIMAM, Amed and ABDALLA, Abdil (1998), "Inter-Arab Trade and the Potential Success of AFTA", *The Arab Planning Institute Working Paper Series* n. 9806, Kuwait.

LIMÃO, N. and VENABLES, A.J. (1999),"Infrastructure, Geographical Disadvantage and Transport Costs", *Policy Research Working Paper* n. 2257, The World Bank, Washington D.C.

LINDER, Staffan B. (1961), *An Essay on Trade and Transformation*, Almqvist & Wiksells, Uppsala, SV.

LINNEMANN, Hans (1966), *An Econometric Study of International Trade Flows*, North Holland Publishing Company, 1st Edition, Amsterdam, NL.

LINNEMANN, Hans (ed.) (1992), *South-South Trade Preferences: The GSTP and Trade in Manufactures*, Indo-Dutch Studies on Development Alternatives n. 9, Sage Publications, 1st Edition, New Delhi and Amsterdam, NL.

LINNEMANN, Hans and BEERS, Cees Van (1988), "Measures of Export-Import Similarity, and the Linder Hypothesis Once Again", *Weltwirtschaftliches Archiv*, Vol. 124 (3), pp. 445-457.

MACDOUGALL, G. D. A. (1951, 1952), "British and American Exports: A Study Suggested by the Theory of Comparative Costs", *The Economic Journal*, Part I, Vol. 61 (December 1951), pp. 697-724; Part II, Vol. 62 (September 1952), pp. 487-521.

MANNING, W.G. and MULLAHY, J. (2001), "Estimating Log Models: To Transform or Not to Transform", *The Journal of Health Economics*, Vol. 20, pp. 461-494.

MARTÍN, Carmela; HERCE, José Antonio; SOSVILLA-RIVERO, Simón and VELÁZQUEZ, Francisco J. (2002), "European Union Enlargement. Effects on the Spanish Economy"*, Economic Studies Series* n. 27, Economic Research Department of the Caja de Ahorros y Pensiones de Barcelona "La Caixa", Barcelona, ES.

MARTÍNEZ-ZARZOSO, Inmaculada and NOWAK-LEHMANN, Felicitas D. (2001), "Augmented Gravity Model: An Empirical Application to Mercosur-European Union Trade Flows"*, IAIER Discussion Paper Series* n. 77, Ibero-American Institute for Economic Research of the University of Göttingen, Göttingen, NL.

MÁTYÁS, László (**1997**), "Proper Econometric Specification of the Gravity Model", *The World Economy*, Vol. 20 (3), pp. 363-368.

MÁTYÁS, László (**1998**), "The Gravity Model: Econometric Considerations", *The World Economy*, Vol. 21 (3), pp. 397-401.

MÁTYÁS, László (ed.) (1999), *Generalized Method of Moments Estimation*, Themes in Modern Econometrics, Cambridge University Press, 1st Edition, Cambridge, UK.

MÁTYÁS, László; KÓNYA, László and HARRIS, Mark N. (2000), "Modelling Export Activity of Eleven APEC Countries", *Melbourne Institute Working Paper Series* n. 5/00, Melbourne.

MCCALLUM, J. (1995), "National Borders Matter: Canada-U.S. Regional Trade Partners", *American Economic Review*, Vol. 85, pp. 615-623.

MICHAELY, M. (1962), *Concentration in International Trade, Contributions to Economic Analysis*, North-Holland Publishing Company, Amsterdam, NL.

NICKELL, S. (1981), "Biases in Models with Fixed Effects", *Econometrica*, Vol. 49, pp. 1417-1426.

NIJKAMP, Peter and REGGIANI, Aura (1992), *Interaction, Evolution and Chaos in Space*, Springer Verlag, Berlin, DE.

NILSSON, L. (2000), "Trade Integration and the EU Economic Membership Criteria", *European Journal of Political Economy*, Vol. 16, pp. 807-827.

OGULEDO, Victor Iwuagwu and MACPHEE, Craig R. (1994), "Gravity Models: a Reformulation and an Application to Discriminatory Trade Arrangements", *Applied Economics*, Vol. 26, pp. 107-120.

PAAS, Tiiu (2000), "Gravity Approach for Modelling Trade Flows Between Estonia and the Main Trading Partners", *Faculty of Economics and Business Administration Working Paper Series n. 4*, University of Tartu, Tartu, EE.

PAAS, Tiiu (2002), "Gravity Approach for Exploring Baltic Sea Regional Integration in the Field of International Trade", *HWWA Discussion Paper Series* n. 180, Hamburg Institute of International Economics, Hamburg, DE.

PAAS, Tiiu (2003), "Regional Integration and International Trade in the Context of European Union Eastward Enlargement", *HWWA Discussion Paper Series* n. 218, Hamburg Institute of International Economics, Hamburg, DE.

PACKAUSKAITE, Juste; LAZAUSKAS, Vystenis and GRIGAS, Sarunas (2002), "Potential Trade Flows Between Lithuania and Countries of the EU. The Application of the Gravity Model", *Vilnius University EconWatch 2001-2002 Projects*, Vilnius University, Vilnius, LT.

PAGAN, A. and VELLA, F. (1989), "Diagnostic Tests for Models Based Upon Individual Unit Data: A Survey", *Journal of Applied Econometrics*, Vol. 4, Supplement, pp. S29-S59.

PAKKO, M.R. and WALL, H.J. (2001), "Reconsidering the Trade-Creating Effects of a Currency Union", *The Federal Reserve Bank of Saint Louis Working Papers Series*, Vol. 83, pp. 37-46, Saint Louis, MO.

PENEDER, M. (2001), *Entrepreneurial Competition and Industrial Location*, Edward Elgar, Cheltenham, UK.

PIANI, Guida and KUME, Honorio (2000), "Fluxos Bilaterais de Comércio e Blocos Regionais: Uma Aplicação do Modelo Gravitacional", *IPEA Working Paper Series* n. 749, Instituto de Pesquisa Económica Aplicada, Rio de Janeiro.

PIROTTE, A. (1999) "Convergence of the Static Estimation Toward the Long Run Effects of Dynamic Panel Data Models", *Economic Letters*, Vol. 63 (2), pp. 151-158.

POMFRET, Richard (1981) "The Impact of EEC Enlargement on Non-Member Mediterranean Countries' Exports to the EEC", *The Economic Journal*, Vol. 91, pp. 726-729.

POLAK, Jacques J. (1996), "Is APEC a Natural Regional Trading Bloc? A Critique of the "Gravity Model" of International Trade", *The World Economy*, Vol. 19 (5), pp. 533-544.

PÖYHÖNEN, Pentti (1963), "A Tentative Model for the Volume of Trade Between Countries", *Weltwirtschaftliches Archiv*, Vol. 90 (1), pp. 93-99.

PREWO, Wilfried (1978), "Determinants of the Trade Pattern Among OECD Countries from 1958 to 1974", *Jährbucher für Nationalokonomie und Statistik,* Vol. 193 (4), pp. 341-358**.**

PULLIAINEN, Kyosti (1963), "A World Trade Study: An Econometric Model of the Pattern of the Commodity Flows of International Trade in 1948-1960", *Economiska Sarnfundets,* Vol. 16, pp. 78-91.

RAMSEY, J.B. (1969), "Test for Specification Errors in Classical Linear Least Squares Regression Analysis", *The Journal of the Royal Statistical Society,* Vol. 31 B, pp. 350-371.

RAUCH, James E. and CASELLA, Allessandra (1998), "Overcoming Informational Barriers to International Resource Allocation: Prices and Group Ties", *National Bureau of Economic Research Working Paper Series*, n. 6628, Cambridge, MA.

RAUCH, James E. and TRINDADE, Vitor (2002), "Ethnic Chinese Networks in International Trade", *The Review of Economics and Statistics,* Vol. 84 (1), pp. 116-130.

ROBERTS, Mark J. and TYBOUT, James R. (1997), "The Decision to Export: An Empirical Model of Entry With Sunk Costs", *American Economic Review,* Vol. 87 (4), pp. 545-564.

ROSATI, Dariusz K. (1992), "Problems of Post-CMEA Trade and Payments", in *FLEMMING & ROLLO (eds.) (1992)*, pp. 75-109.

SANSO, Marcos; CUARAIN, Rogelio and SANZ, Fernando (1993), "Bilateral Trade Flows, The Gravity Equation and Functional Form", *The Review of Economics and Statistics*, Vol. 75 (2), pp. 266-275.

SAPIR, André (1981), "Trade Benefits Under EEC Generalized System of Preferences", *European Economic Review*, Vol. 15, pp. 355-399.

SAPIR, André and LUNDBERG, L. (1984), "The US Generalized System of Preferences and its Impact", in *BALDWIN & KRUEGER (eds.) (1984)*, pp. 195-231.

SAPIR, André; AGHION, Philippe; BERTOLA, Giuseppe; HELLWIG, Martin; PISANY-FERRY, Jean; ROSATI, Dariusz K.; VIÑALS, José and WALLACE, Hellene (2003), "An Agenda for a Growing Europe: Making the EU Economic System Deliver", *European Commission Lisbon Strategy Report*, European Commission, Brussels, BE.

SATTINGER, M. (1978), "Trade Flows and Differences Between Countries", *Atlantic Economic Journal*, Vol. 6, pp. 20-22.

SCHUMACHER, Dieter (2001), "Market Size and Factor Endowment: Explaining Comparative Advantage in Bilateral Trade by Differences in Income and Per Capita Income", *Deutsches Institut für Wirtschaftsforschung Discussion Paper Series*, n. 259, Berlin, DE.

SEN, Amartya and SMITH, T. E. (1995), *Gravity Models of Spatial Interaction Behaviour*, Springer Verlag, Berlin, DE.

SILVA, J.M. Caravana Santos and TENREYRO, Silvana (2003), "Gravity-Defying Trade", *The Federal Reserve Bank of Boston Working Paper Series* n. 03-1, Boston, MA.

SILVA, J.M. Caravana Santos and TENREYRO, Silvana (2004), "The Log of Gravity", *further coming*.

SMARZYNSKA JAVORCIK, Beata K. (2001), "Does Relative Location Matter for Bilateral Trade Flows? An Extension of the Gravity Model", *The Journal of Economic Integration*, Vol. 16 (3).

SOLOAGA, Isidro and WINTERS, L. Alan (1999), "Regionalism in the Nineties: What Effect on Trade?", *World Bank Trade Research Working Paper*, Washington D.C.

SRINIVASAN, T. N. and CANONERO, C. (1993), "Preferential Trade Arrangement: Estimating the Effects on South Asia Countries", *World Bank Report on South Asia Region*, Washington D.C.

THARAKAN, P.K. Mathew (2002), "Exports and Distance in a Digitalized World: Gravity Model Applied to the Indian Exports Software", Proceedings of the *ISEG-UTL Economics Department Seminar* n. 9/02, Lisbon, PT.

THOUMI, Francisco E. (1989), "Bilateral Trade Flows and Economic Integration in Latin America and the Caribbean", *The World Development*, Vol. 17 (3), pp. 421-429.

THURSBY, Jerry G. and THURSBY, Marie C. (1987), "Bilateral Trade Flows, the Linder Hypothesis and Exchange Risk", *The Review of Economics and Statistics*, Vol. 69 (3), pp. 488-495.

TINBERGEN, Jan (1962), *Shaping the World Economy. Suggestions for an International Economic Policy*, Twentieth Century Fund, NY.

TOVIAS, Alfred and DAFNI, Inon (2001), "From 15 to 21: The Impact of the Next EU Enlargement on Mediterranean Non Member Countries" (Proceedings of the *2nd Conference held by Euro-Mediterranean Forum of Economic Institutes* on March 30th), Marseille, FR.

UNCTAD (2003), *2003 World Investment Report*, United Nations, Geneva, CH, and New York, NY.

VERNON, R. (ed.) (1970), *The Technology Factor in International Trade*, Columbia University Press, NY.

VINER, J. (1950), *The Customs Union Issue*, Carnegie Endowment for International Peace, NY.

WALL, Howard J. (2000), "Gravity Model Specification and the Effects of the Canada-U.S. Border", *The Federal Reserve Bank of Saint Louis Working Papers Series*, September 2000, Saint Louis, MO.

WALL, Howard J. (2002), "Has Japan Left Out in the Cold by Regional Integration?", *Bank of Japan's Monetary and Economic Studies*, n. 20, pp. 117-134, Tokyo, JP.

WANG, Zhen Kun (1992), "China's Potential Trade: An Analysis Based on the Gravity Model", *Department of Economics Paper Series*, University of Birmingham, Birmingham, UK.

WANG, Zhen Kun and WINTERS, L. Alan (1991), "The Trading Potential of Eastern Europe", *CEPR Discussion Paper,* n. 610, CEPR, London, UK.

WEI, Shang-Jin (1996), "Intra-National Versus International Trade: How Stubborn are Nations in Global Integration", *National Bureau of Economic Research Working Paper Series*, n. 5531, Cambridge, MA.

WEI, Shang-Jin and FRANKEL, Jeffrey A. (1997), "Open Versus Closed Trading Blocs", in *ITO & KRUEGER (eds.) (1997)*, ch. 5.

WHITE, H. (1980), "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity", *Econometrica*, Vol. 48, pp. 817-838.

WINKELMANN, Rainer (1997), *Econometric Analysis of Count Data*, Springer-Verlag, 1st Edition, Berlin, DE.

WINTERS, L. Alan (ed.) (1992), *Trade Flows and Trade Policy After '1992'*, Cambridge University Press, 1st Edition, Cambridge, UK.

WINTERS, L. Alan and WANG, Zhen Kun (1994), *Eastern Europe's International Trade*, Manchester University Press, Manchester, UK.

WITTER, M.; BRIGUGLIO, L. and BHUGLAH, A. (2002), "Measuring and Managing the Economic Vulnerability of Small Island Developing States" (Proceedings of the *Global Roundtable on Vulnerability and Small Island Developing States: Exploring Mechanisms for Partnerships* on May 9th-10th), Montego Bay, Jamaica.

WOOLDRIGDE, Jeffrey M. (2003), *Introductory Econometrics: A Modern Approach*, South-Western Editors, Mason, OH.

ZYSMAN, J. and SCHWARTZ, A. (eds.) (1998), *Enlarging Europe: The Industrial Foundations of a New Political Reality*, Copenhagen Business School Press, Copenhagen, DK.

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